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WHITEWATER BOATING ON THE PIEDRA RIVER
A MANAGEMENT OPPORTUNITY PRECEEDING IMPACT

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ABSTRACT

The phenomenal growth in whitewater boating since the middle 1970's that occurred on other western rivers did not happen on the Piedra River. Growth of whitewater boating on this river was held back because two unrelated events became barriers to boating: the Emmert decision of the Colorado Supreme Court and mudslides along the First Fork Road. This paper examines the potential for increased whitewater boating on the Piedra River now that the barriers are removed.

A comparison of the Piedra was made among 10 other western rivers. The reported boating use for these rivers, similiar to the Piedra, was analyzed through three curve fitting programs. A projection of expected boating use was then developed for the Piedra. The resulting projection for increased use is supported by research findings on other rivers and observations of users. User shifts to rivers such as the Piedra are occurring because of rationing on more well known rivers, overcrowding on rivers where user density controls are not exercised and the nationwide increase of users seeking new river recreational experiences.

Despite the projected increase of boating use, managers of the San Juan National Forest have the opportunity to implement whitewater management to avoid adverse impacts that plague other western river managers (through the use of Region Two's Uniform Forest Management Prescription 10D). To develop desirable user patterns and behavior, the Forest needs to take advantage of the wealth of information that exists and provide this information to the public. This effort should be directed toward assisting the recreationist in planning their adventures as well as promoting the indirect effect of influencing the user to care for and protect the river environment.

Minimal facilities need to be installed to assist the manager in monitoring use on the Piedra as well as providing assistance to the recreationist. To establish a baseline to measure change, the Forest also needs to inventory the existing and potential campsites and areas where users concentrate.

> "This paper was prepared as a student project in partial fulfillment of the requirements of the Professional Development for Outdoor Recreation Management Program at Clemson University. It in no way reflects U.S. Forest Service policy nor are the opinions expressed those of anyone other than the author."

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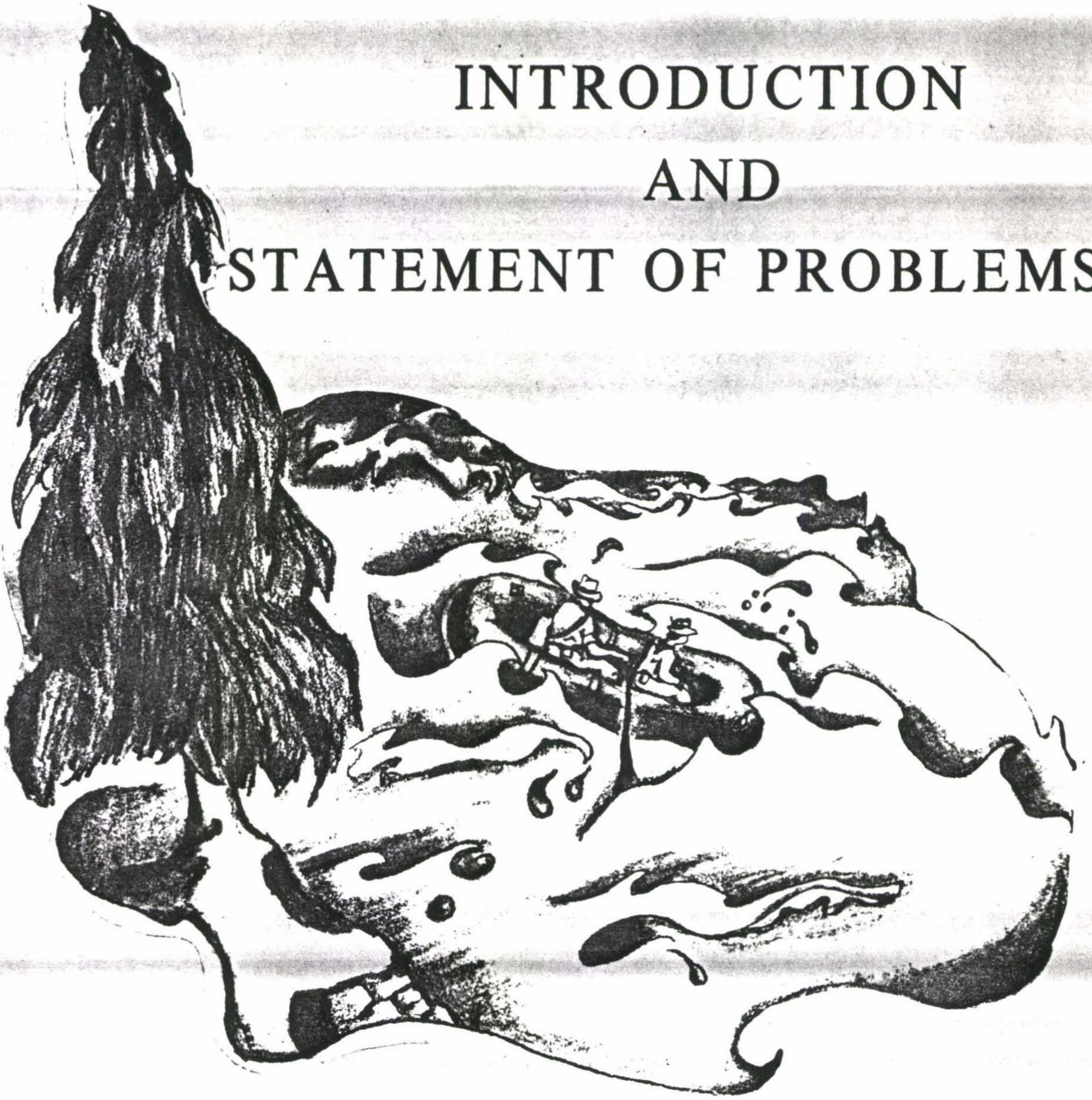
INTRODUCTION
AND
STATEMENT OF PROBLEMS



CHAPTER I

During 1978, the San Juan National Forest received several inquiries a week asking for river information. The floating use continued to increase as expected. In 1979, however, the orderly chronology of use was interrupted. Vehicle access to the First Fork Bridge, the middle of the floatable segment, was severed because of a massive mudslide. The slide literally dumped a portion of the First Fork Road into the river. Also, the Emmert case was being hard fought in the Colorado Court system.

The Colorado Supreme Court [1/] upheld a criminal trespass conviction for a July 3, 1976 incident where a rafting party floated through privately owned property on one of the State's rivers. Colorado's criminal trespass statutes prohibit anyone from unlawfully entering or remaining upon "premises." State statutes did not yet define exactly what the term "premises" meant at the time of the 1976 incident. In 1977, the legislature added a clarifying definition to the State's criminal code that includes real property, improvements, and stream banks and beds, but it excludes water surface and airspace. [2/] What this means to recreational users is that Colorado's criminal trespass statutes do not apply to use of the water's surface. In a carefully worded statement on August 31, 1983, the Attorney General summarized the effect of the legislation: "In conclusion, it is my opinion that one who floats upon the waters of a river or stream over or through private property, without touching the stream banks or beds, does not commit a criminal trespass..."

Until the First Fork Road was repaired and the Emmert decision resolved, floating on the Piedra river virtually stopped. During 1983, both barriers to boating were removed. As expected, whitewater use immediately commenced at rates indicative of the earlier period. It is evident that these two unrelated events all but stopped use on the Piedra River during a period when other rivers were experiencing large increases in whitewater recreational activities.

[1/] Colorado Supreme Court Decision No. 28235

[2/] Section 18-4-504.5, Colorado Revised Statutes, 1973

I. INTRODUCTION AND STATEMENT OF PROBLEMS

A. Piedra River: Its Background

If the whitewater enthusiast is looking for the ultimate in whitewater, it probably will not be found on the Piedra River. Even so, the churning rock-strewn maelstrom may quickly be a condition above the boaters' ability. The whitewater potential of the Piedra River was one of the best kept secrets in the State of Colorado, if not the nation, until the Piedra was named a study river in Section 5(a) of the Wild and Scenic Rivers Act.

Early boaters floated sections of the Piedra River to fish its magnificent pools. Rarely did any boaters meet head on with the churning water, powerful holes, and twisting waves. Only a handful of boaters challenged the huge waves and plummeting currents for the thrill of whitewater boating. When the Piedra was named as a study river under Public Law 93-621 in 1975, boaters started to inquire about the whitewater character of the river. The newcomers infringed upon the perceived proprietorship of that proud fraternity who clearly believed that it took special skills and resourcefulness to float the Piedra.

During 1977, the first of several commercial operators met with the Forest Service to look at business possibilities for the Piedra. Water temperature, isolation of the box canyons, difficulty of rapids, and the short floating season were cited most often for the "thanks but no thanks" attitude toward starting commercial ventures on the river. In spite of the lack of commercial interest, by the end of the 1977 floating season, enough use had been observed to report whitewater boating in the annual recreation use reports.

An outfitter-guide permit was issued in 1982 for commercial use below Sheep Creek. The permitted activity was to be in connection with commercial trips that put in on the National Forest but was more associated with other recreational events on the Southern Ute Indian Reservation.

2. Uniform Forest Management Prescription 10D (Region Two):
Region 2 of the Forest Service developed a number of management prescriptions for use in the Forest Plans throughout the Region. Prescription 10D provides general management direction for broad activities in the wild and scenic rivers corridors, but fails to address specific Recreation Opportunity Spectrum (ROS) classification and permissible use levels. Nor does it address specific recreational activities such as whitewater boating. This study will clarify the general management direction and adapt the prescription to management of whitewater boating.

3. Whitewater Recreational User Control and Constraints:
The perennial management question continues to be: When and how should agencies implement controls necessary to ensure that the public is afforded opportunity to realize its expectations for whitewater boating? There are two areas of public need that the agency must consider.

(a) The study decides what information the public needs in order to plan a trip on the Piedra.
(b) This study also enumerates what user controls or constraints are needed to assure a satisfying float trip.

4. Management Facilities and Developments: River runners, environmentalists and others often question the need for facilities that are a convenience for the user. This study recommends the level of development needed to assist the visitor as well as protect the physical environment. Campsites need to be inventoried and measures taken to prevent overuse.

C. Whitewater Use: The Need for Additional Planning

The San Juan National Forest has an enviable position because of the circumstances that suppressed growth of whitewater floating on the Piedra River. The Forest has time to plan in advance of social

Presently, the river corridor only has two areas having adverse ecological effects from overuse by recreationists. In both cases, the depreciating use is related to fishing and other land based recreation opportunity rather than whitewater boating. The meadow at the Sand Creek confluence is heavily used by back packers during the summer and large horse operations during the fall big game seasons. The large meadow immediately below the First Fork Bridge has sustained damage resulting from uncontrolled vehicle damage.

B. Whitewater Use: A Statement of Problems

Three planning efforts that affect the Piedra River are completed. The Wild and Scenic Rivers Study was completed during 1979. The study concluded that the Piedra River, indeed, was a worthy addition to the nation's wild and scenic rivers system. The San Juan National Forest Land and Resourcement Management Plan and its Final Environmental Impact Statement was completed, approved, and released to the public on September 29, 1983. The companion study of wilderness potential for the Piedra Wilderness Study Area was completed at the same time as the Forest Plan. Each of the three efforts addressed the numerous concerns of resource management along the Piedra River and its corridor. Unfortunately, all three efforts do not specifically address whitewater boating in sufficient detail to guide management in handling river floaters.

This study will look at four management questions regarding whitewater use on the Piedra. They are:

1. Whitewater Use: Past, Present and Future. Will the level of whitewater floating attain such numbers that user rationing will need to be implemented? This study developes a prediction as to the level of use that will occur on the Piedra River.

While Jubenville addressed the role of planning among all levels of government, the theme of the "principle of overloading" should not be lost on river management. If one agency at any level of government fails to provide responsible management of its rivers and potential whitewater boating, this may cause overloading or overcrowding on other rivers in the area. The condition could ultimately lead to necessarily severe user limitations or unacceptable environmental damage along streams that are not relieved from over use. Expanding the idea beyond regional boundaries, encouragement of the type of use that the Piedra can accommodate could well be a catalyst in protecting other western rivers.

D. This Study: Its Purpose

This study has three major thrusts or objectives. They are: 1) to predict use trends and identify actions for management of whitewater floating use on the Piedra River. 2) recommend specific management actions, public information documents and facilities needed to manage whitewater recreation, and 3) discuss some of the various opportunities for additional research and administrative studies that will provide a continuing source of information for future river management and planning. The study will provide the framework to meet the intent of the direction of the San Juan National Forest Land and Resource Management Plan.

This study is being made to fulfill partial requirements of the Outdoor Recreation Management Short Course taught by Clemson University. The fulfillment of this requirement will assist the management team of the San Juan National Forest to establish additional management direction to implement the Forest Plan and quickly respond to the planning requirements if the river is added to the national rivers system. If the Piedra Wilderness Study Area is included in the national wilderness system, this study will also provide the framework for wilderness whitewater use.

and environmental impacts. In his article with Mak and Hartman, Jensen, an early river manager, described some of the first whitewater use planning efforts of the National Park Service. He pondered a germane point that the action to limit use in Cataract Canyon was quite simply an interim management response to use pressures and designed to protect the interest of the Park and its environment until results of scientific study could be completed and incorporated into further management decisions (Mak, Jensen, and Hartman, 1977). Commenting on the problems and extreme criticisms the agency and managers received, he summarized:

> "The lack of planning and management decisions in advance of the use impacts is one reason why managers with great regulatory powers over a vast national trust whose management is dependent upon solid thinking and judgment, get into such predicaments when only following orders."

Managers are confronted with myriad administrative problems in dealing with recreational use of rivers. They constantly make decisions on complex, sensitive issues without adequate resource and user data (Lewis and Marsh, 1977). In the case of the Piedra, the Forest has the opportunity to collect the necessary data to pronounce carrying capacities and user levels that demand control and constraint.

A striking parallel relationship exists between current trends in whitewater use on western rivers and a condition called the "principle of overloading" (Jubenville, 1976). In his text, OUTDOOR RECREATION PLANNING, Allen Jubenville, writes:

> "Each level of government must accept its responsibility in provisioning for public services, including outdoor recreation. It may provide these services directly as the managing agency or through a quasi-public, nonprofit corporation, or indirectly by encouraging private enterprise to assume certain marketable services. Regardless of who offers the service, the responsible level of government should coordinate the planning or act as a catalyst in meeting the needs of the people within its social-political boundaries. Failure to assume this responsibility results in overloading the site developments of other levels of government."

E. This Study: Its Scope and Delimitations

The land and resource management plan for the San Juan National Forest provides ample management goals, direction, guidelines and standards for land based recreational activities. However, the plan is generally silent on recreational activities taking place on the surface of water whether it be streams, rivers or lakes and reservoirs. The scope of this study is focused on the special recreational nature of the floatable segment of the Piedra River in the San Juan National Forest.

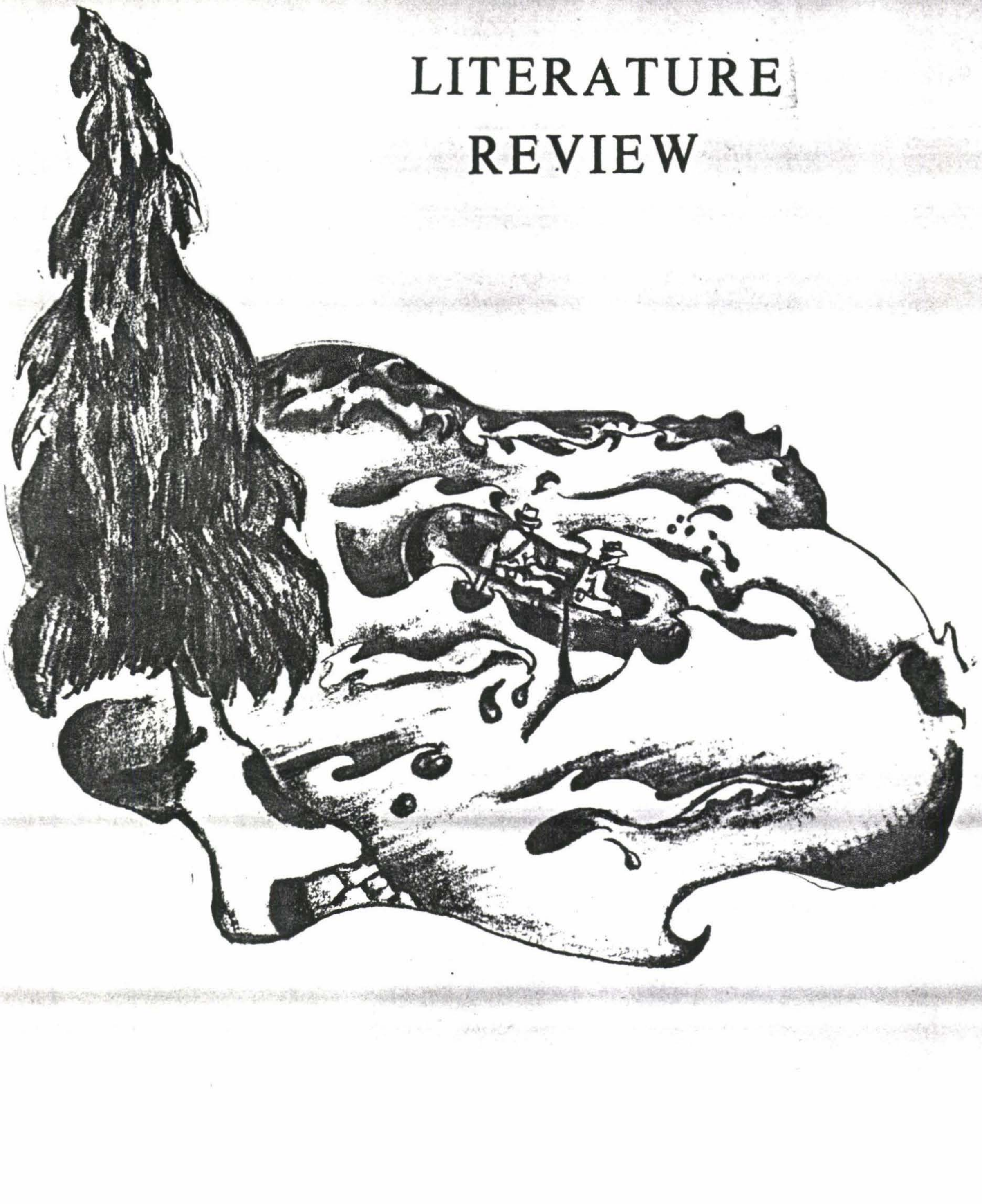
Delimitations of the study are:

1. Whitewater boating is the only recreational activity addressed: There are a large number of stream bank and river corridor recreational actities that take place along the Piedra River. The Land and Resource Management Plan adequately addresses these recreational activities. Where conflict exists between the boater and a shore activity, it is mentioned.

2. The study only addresses the nonwilderness segment that is recommended for wild classification: To study the wilderness/wild segments and the nonwilderness/scenic or recreational, or even the segments not eligible, would extend the time needed for study as well as this documents length.

Several areas of study have specific limitations because of technique, available information, or lack of need. These areas are identified in the text when they occur.

LITERATURE REVIEW



CHAPTER II

1. The 1977 Minneapolis Symposium: The record of the proceedings of river management and research, in Minneapolis, (1977) formed the basis of the literature review. Wilderness user and carrying capacity research has received the attention of social scientists and U.S. Forest Service research units for several decades. Prior to the mid 1970's, very little attention was given to research projects dealing with the characteristics of rivers, their environments and users. In 1977, the first national symposium on river recreation management and research was held. The timeliness of the Symposium attracted over 400 participants, representing all types of interest in river management at all governmental levels, attesting to the interest in river research and management (Lime, 1977).

2. The 1983 Recreation Research Bibliography: In January 1983, the Forest Service published a bibliography of recreation research publications between 1961 and 1982. The majority of research publications treating direct river recreation and environmental research were published after 1977, indicating an expansion in river research over the pre-1977 level. In compiling this document, the authors listed all recreation research publications dating back to 1961 (Echelberger, Gilroy, and Moeller, 1983).

3. Westfornet: Westfornet was utilized to identify research and management publications not of Forest Service origin. Westfornet, like Southfornet, is a computer based document search system (Rutherford, 1983). These programs utilized various files that list publications through identifying words and key phrases. For this study, Westfornet provided two file searches using key descriptors or user displacement, lottery disappointment, river allocations and float permits. First search was Database AGRICOLA File Numbers 10, 110. The second was database CAB File Number 50 with recreation and forestry subfiler. Westfornet yielded several research works important to this study.

II. LITERATURE REVIEW

Planning and management for rivers had the same late start as did river related recreation research. Wilderness planning and management had its beginnings in the Federal sector during the era when Carhart and Leopold were working for the setting aside of undeveloped areas for wilderness. These areas would be the basis for the future National Wilderness Preservation System (Hendee, Stankey, and Lucas, 1978). In the discussion of "Roots of Wilderness Appreciation," a recap of wilderness history and philosophy, an interesting parallel is drawn between historic wilderness and contemporary river management. Among other things, the authors point out that the level of wilderness type mountain climbing in the late 1940's was about the same as the number of persons running the Colorado River.

More importantly, Hendee and his colleagues stressed that the first vestiges of wilderness recreational management were to set aside undeveloped areas without defining what a wilderness experience would be. This has, to a similar degree, occurred with the management of rivers. Seemingly, agencies do not define what types of experience a river should provide until impact problems occur and management is forced into schemes whose development is driven by environmental or social degradation. In these instances the personal experience, feelings and intuition of the managers or planners will probably override the needs of the user.

This chapter provides the theoretical basis for the conclusions drawn in the study of whitewater use on the Piedra River.

A. Literature Search: Techniques

The first task of the review was to limit the research reports, texts, management studies and other publications to only those needed to address the study problems. Three tools were used to identify available literature:

Another viewpoint expressed lately, is that user satisfaction and sensitivity may not be the reason for displacement (Dustin and McAvoy, 1982) They assert that people adapt to the decrease in recreational experience quality all too easily. Dustin and McAvoy argue that planning should not promote a successional pattern of use that leads to a decrease in recreational expectations and environmental quality. The basis of their concern is their belief that past research has failed to recognize that "..recreationists sensitive to crowding and environmental despoilation may have already moved to other areas...repeat visitors are readjusting their expectations to conform to the changing nature of recreation opportunities...a new generation of recreationists are expecting greater numbers of people and problems, and consequently are more tolerant of them." They write:

> "Underpinning this pattern of visitor invasion and succession is a recreation planning and management process that is based largely on what a majority of people have been satisfied with in the past."

Instead of establishing a well argued case that displacement for any reason is not occurring at expected rates, they appear to add another reason for displacement. Their apparent reason for displacement could be defined as user dissatisfaction with management response that occurs when rivers become crowded.

A parallel can be drawn between river use and lake use. Visitors in the Boundary Waters Canoe Area Wilderness will suffer displacement but seek to continue the past recreation experience (Anderson, 1981). Anderson's research concluded that when visitors were displaced, they sought out other areas that promised to provide what they had become accustomed to in the past.

B. Literature Reviewed: What Research Says

The literature reviewed is divided into groupings according to the thrust of the study. The discussions of the scientists provide the theoretical basis for the assumptions made and the conclusions drawn.

1. Will whitewater boating increase on the Piedra River? The question has a twofold emphasis; To determine how rapidly and why use will increase on the Piedra River. The arguments presented in the literature suggest that use on all rivers will increase where no rationing is taking place. Early river managers point out that phenomenal increase in whitewater recreation was attributed to the rapid growth in popularity throughout the country. As more persons became accomplished in river skills, they started new businesses and attracted new users. Additionally, whitewater equipment became more available (Mak, Jensen, and Hartman, 1977).

   Mak and his colleagues also described the observation that user limits on more popular rivers created a shift and increased interest in little known rivers. The research community gave definite support to this notion. Letherberry suggested that measures to limit use, while effective at their intended locales, have caused corresponding dramatic increases on other rivers where no restrictions yet exist (Letherberry, Lime, and Thompson, 1980). In his study of density, crowding and satisfaction, Heberlien points out that even the Grand Canyon with its unique resource character that tends to overpower any effect of density on user satisfaction, has had visitors that were displaced (Heberlien, 1977). An obvious example of user displacement is the dam on the upper Stanislaus River inundating a 10 mile stretch of river with whitewater use level of 78,000 RVD's (Lewis and Marsh, 1977). These users were no doubt shifted to other rivers in California.

2. Does Uniform Forest Management Prescription 10D Need ROS User Coefficients? Management prescriptions are developed to direct specific management activities on similar land types as well as achieve desired management objectives. The Rocky Mountain Region designed standard prescriptions to facilitate management as well as public understanding by highlighting the similarities and differences between Forests through consistent use of terminology. The regional prescriptions are developed based on common goals and objectives for similar land types. These were then adapted by individual Forests to address unique situations at the Forest level.

The prescription for management area 10D provides for Wild and Scenic Rivers. The goal of the prescription is to manage wild river segments to be free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible in places by roads (see Appendix A). The prescription outlines general direction, standards and guidelines for vegetative diversity, cultural resource management, dispersed recreation, and various other resources found in the river corridors. The general direction for dispersed recreation, which includes whitewater boating, provides for semi-primitive nonmotorized recreation in an unmodified setting. However, the prescription is silent on such management concerns involving user density for land and water recreational activities. The prescription does not contain user coefficients for the ROS classes.

Most Uniform Management Prescriptions relate the management direction to the Recreation Opportunity Spectrum (ROS). Usability of ROS classes occurs because possible mixes or combinations of activities, settings and recreational opportunities are arranged along a spectrum, or continuum. The goal of the resource manager is to provide opportunities for recreation that the recreationist has come to expect (USDA-ROS User Guide, 1982). These expectations also include an estimation of perceived quality.

In 1978 the outcomes of the lottery on the Middle Fork of the Salmon were studied. It was found that those who were successful in the lottery would use the permit, cancel out or become a no-show. Also, the person unsuccessful in the lottery could still gain access to the river by going with another who had a permit, wait for a cancellation or no-show at the launch point, float without a permit, or float during the off-season when the lottery is not in effect (McCool and Utter, 1981). In spite of the number of opportunities available to gain access to the river, 35 percent of the unsuccessful lottery participants floated other rivers.

Only 43 percent gained access to the river through the other post-lottery opportunities. Twenty-two percent indicated that they either stayed at home or pursued another vacation activity. The results of McCool and Utter's study indicate that at least 57 percent of those persons failing to get a permit on rivers that have rationed use would or could seek out another river. In a practical sense, the percentage could be higher from year to year by including a number of users that in fact gained access to the Middle Fork of the Salmon during 1977, but in the future would be unable to go with others who had permits, or the number of cancellations/no-shows could decrease as demand for permits increases.

The scientific evidence overwhelmingly supports the notion that user shifts, for one reason or another, occur as the more popular rivers become overcrowded. The literature does not suggest specific rivers to which use is shifting. Since most popular and well known rivers are under user rationing of one form or another, the major shifts have to be to rivers such as the Piedra. The literature definitely supports the conclusion that once the physical and legal barriers to floating the Piedra are removed, whitewater boating will become an increasing trend.

3. How should whitewater use on the Piedra River be managed? To be more effective, the planning and management documents must be more specific in what type of recreational experience is to be provided (Heberlien, 1977). This in turn demands that river managers and agencies understand what the whitewater enthusiast is expecting in recreational experience. Further, the idea exists that the manager's intuitions are often not congruent with user values and opinions (Lucas, 1964, Hendee and Harris, 1970, Peterson, 1974, and Haas, 1979). This situation will continue to exist so long as managers rely on experience and intuition rather than soundly determined user data. One notion argues that managers have too often responded to what a majority of people said was a satisfactory experience, thus leading to adaptation and acceptance of less quality in the recreation experience, (Dustin and McAvoy, 1982). Nevertheless, most scientists agree that the manager needs to know what the recreationist expects in an experience (Heberlien, 1977, Johnson and Carothers, 1982, Wagar, 1976, Schreyer, 1980, Clark, Hendee, and Campbell, 1971).

Driver (1977) developed scales which identify and measure many of the expectations held by recreationists including solitude, action/excitement, status, affiliation, learning/discovery and stress release/escape (McCool & Utter, 1981). Whatever the motive, the manager must realize that a recreation experience involves a number of steps before the planned activity is consummated (Schreyer, 1983). Schreyer indicates that a good portion of realizing a recreational experience is dealing with the planning and information necessary to carry an activity to fruition. His model, the recreation experience, involves five major processes before the visitor arrives on site for the planned activity. Each of these steps, past the point of arousal (when the idea to do something first jells) requires information provided by the manager.

The early foundations for ROS classes had three basic components of carrying capacity: management objectives, visitor attitudes, and recreational impact on physical resources (Lime and Stanky, 1971). In the early development period of ROS concepts, it was pointed out that managers would be expected to provide the appropriate recreational opportunities on the most appropriate areas, and not, as may often have been the case in the past, provide for demands where users have created them through custom or tradition (Ohmann, 1974). Another concept that emerges is that management should not provide for the "mythical average user" because it is likely that no one would be satisfied (Haas, 1979 and Shafer, 1969). To avoid averaging in developing the ROS classification system, elements of the recreation opportunity demand hierarchy were used (Driver and Brown, 1978).

Comparing the work of Driver and Brown with Clark and Stanky, the Forest Service combined the two efforts and developed the current system (Schreyer, 1983). It is apparent that river management plans need to articulate user levels for water surface recreational activities that correspond with the ROS classification system. The work of Brown, Driver, and McConnell (1978) strongly suggests that to quantify supply, coefficients are needed that determine maximum, and in some cases, minimum capacity levels for different experience opportunities.

The preponderance of scientific evidence suggests that the Uniform Forest Management Prescription 10D should contain standards that relate to the supply of recreational opportunity. The literature indicates that it is possible to enumerate ROS capacities for management of wild and scenic river units, although, in some instances there is additional research needed to fully develop and apply ROS concepts to water surface activities.

4. What changes are needed in the historical management response?

There have been many opinions written as to what controls and/or constraints should be placed on the user. The literature, in instance after instance, has examples critical of managers and planners. In 1977, Thomas Herberlein wrote:

> "Managers seem more comfortable saying, 'The parking lot isn't big enough so you can't come in,' rather than saying You can't come in because too many people will reduce the quality of the experience for others."

Prior to the creation of the Interagency Whitewater Committee, Federal land managers responded to visitor use pressure problems in about the same manner (Mak, Jensen, and Hartman, 1977).

> "Their basic response was to (1) set up interim limits and requirements, (2) initiate research and/or study programs, (3) gather public input, and (4) develop more complete management plans on the basis of number two and three within the basic authority granted by Congress to the managing agency for a specific river or river segment."

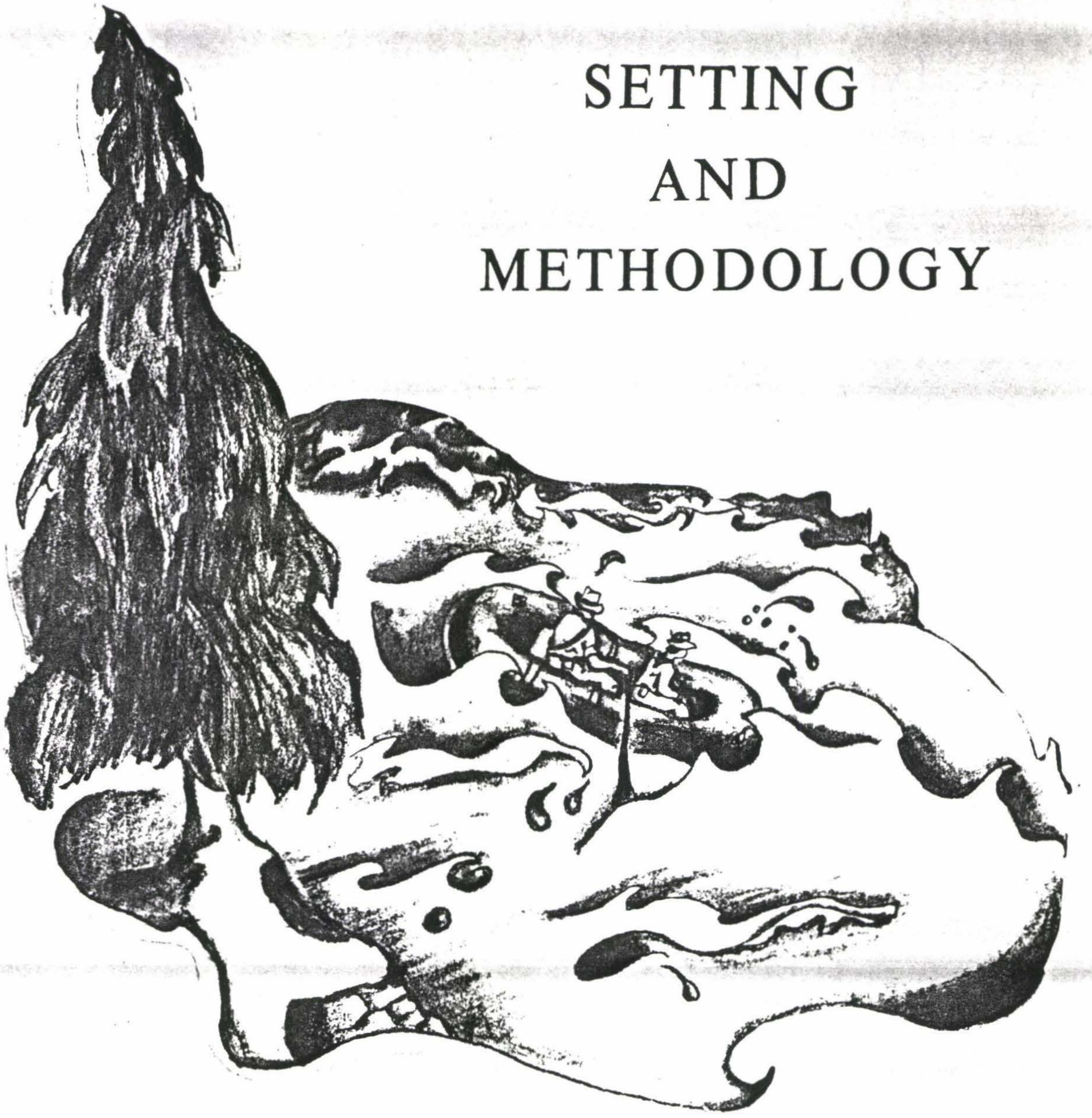
Various comments in the literature critical of the typical management response fully indicate that agencies should plan for desired results and then educate the public to achieve those results.

According to Schreyer, the period when information is most needed by the recreationist is when the person is deciding to participate in an activity. Schreyer calls this the period of building commitment or deciding to go. Immediately following the decision to go, is the anticipation (gearing up) period. Information provided during this period sets up the user expectations. It is argued that this information is most critical since wrong or bland information can set up erroneous user expectations thus destroying the desire or commitment and resulting in an unfavorable public impression.

Behavioral and educational psychologists have shown that people tend to persist in doing the things they find rewarding (Wagar, 1976). This implication supports Schreyer's thought that if the user is adequately prepared through good information, the trip being planned will probably leave the user with the desire to participate in the activity again. That is, running the same river or other future additional river trips.

The majority of the research works indicate that the user should be able to maintain freedom of choice to pursue recreational experiences. The Forest Service tradition of largely unfettered recreational use has led to an emphasis on freedom of choice for the user (Washburne and Cole, 1983). The literature overwhelmingly suggests that managing agencies need to concentrate on providing accurate information to the recreationist. This supports the conclusion that to provide better recreation information will assist the recreationist in achieving appropriate expectations. This should be of high management priority.

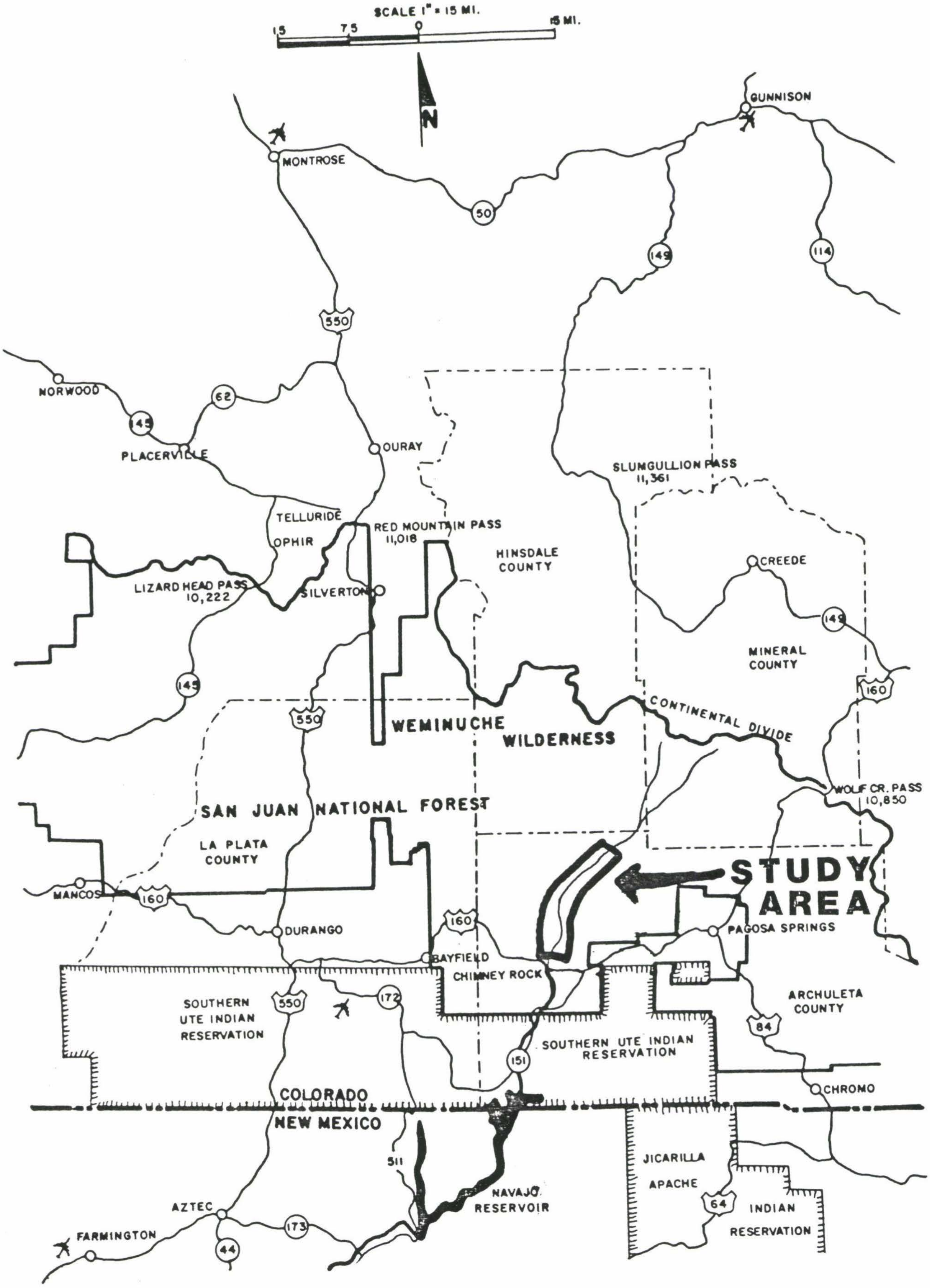
SETTING
AND
METHODOLOGY



CHAPTER III

FIGURE I

Location Map Piedra River


SCALE 1" = 15 MI.
15
7.5
0
15 MI.
N
GUNNISON
MONTROSE
50
149
114
550
NORWOOD
62
145
PLACERVILLE
OURAY
SLUMGULLION PASS
11,361
TELLURIDE
OPHIR
RED MOUNTAIN PASS
11,018
HINSDALE
COUNTY
CREEDE
LIZARD HEAD PASS
10,222
SILVERTON
149
MINERAL
COUNTY
145
160
550
WEMINUCHE
WILDERNESS
CONTINENTAL DIVIDE
SAN JUAN NATIONAL FOREST
WOLF CR. PASS
10,850
LA PLATA
COUNTY
STUDY
AREA
MANCOS
160
160
DURANGO
PAGOSA SPRINGS
BAYFIELD
CHIMNEY ROCK
SOUTHERN
UTE INDIAN
RESERVATION
550
172
ARCHULETA
COUNTY
84
151
SOUTHERN UTE INDIAN
RESERVATION
CHROMO
COLORADO
NEW MEXICO
511
JICARILLA
APACHE
INDIAN
RESERVATION
64
NAVAJO
RESERVOIR
AZTEC
173
44
FARMINGTON

III. SETTING AND METHODOLOGY

This study will establish a definitive management objective for the Piedra River. To answer basic management questions regarding management of the whitewater boating and recreational experience, it was necessary to closely study available data from other western rivers. Data were requested from other river managers and compiled in a manner to draw conclusions of where the Piedra may fit in the overall scheme of providing whitewater recreational experiences.

To better understand how the Piedra River compares with other rivers, a description of the river and its environment follows. This description supplements the various river descriptors given in the River Information Digest (Interagency Whitewater Committee, 1982). The Digest uses 21 major descriptors to characterize each river. These descriptors cover five broad areas: physical character, recreational activity opportunity, user constraints, user conveniences, and agency designations. See Appendix B.

A. Piedra River: Its Setting and Whitewater Character.

1. Regional Setting: The Piedra River is a northeasterly tributary of the San Juan River. The San Juan River, located in the "Four Corners" area of Colorado, Utah, Arizona and New Mexico, is the second largest tributary to the Colorado River system (see Figure I).

   The 371 square miles drained by the Piedra above Colorado Highway #160 are primarily public lands within the San Juan National Forest. This area is a productive watershed, annually producing approximately a quarter million acre feet of water.

The segment from Indian Creek downstream to the Colorado Highway #160 bridge features fast water but without the crushing rapids of the Box Canyons. The pool/riffle ratio is more favorable. This segment is swift but lacks the dangers and difficulty for whitewater boating found in the upstream reach. Here, topography of the river bottom widens. Agriculture and subdivision is predominate use of private lands. The lower segment is served by roads paralleling the river on both sides. The grey, bluffy slopes of Mancos shale on the north side of Colorado Highway #160 signals the end of the river trip. A Forest Service Campground is located at the take out.

3. Whitewater Character: The Piedra River plunges out of the San Juan Mountains, gathering up its tributaries and more than doubling its size in a short 20 mile sprint from the Piedra River bridge on FDR 631, and U.S. Highway #160 bridge. The 53.3 feet per mile gradient of this reach hints at the ferocity of the whitewater concealed within its box canyons. The 20 mile stretch is difficult, if not impossible, at some water levels.

The Piedra is not a "run a rapid and rest" type of river like those found in the desert canyonlands. A river dropping fifty-three feet per mile with numerous tangles of exposed or submerged rock and unbroken stretches of whitewater, with very few quiet recovery pools, requires as much skill, expertise and respect from boatmen as does larger rivers. The floatable segment of the Piedra is characterized as a riffle that is 20 miles long, interrupted or punctuated by churning rapids with significant falls, huge holes and large hydraulics.

At higher water levels (1000 + cfs), the larger rapids consist of huge hydraulics and holes and the flatter water, occasional holes and numerous large boulders. Below 1000 cfs., the river is an uninterrupted rock garden, permitting even the best boatman to avoid only a few of the unyielding obstructions.

The Piedra, being located in the "Four Corners" area of Colorado, is locked into the contrast of the southwest desert lands meeting with the high Colorado Rocky Mountains. Backdropped against the vast stretch of mesas, canyons, and rolling land form is the massif of the San Juan Mountains.

2. River Description: When the Piedra River flows under the Forest Development Road #631 (FDR #631) bridge, it quickly loses its meandering character, beginning an alternate series of rushing cascades and sluices on its course of cutting through sedimentary rocks laid down during the Mesozoic Era. Below the bridge the river flows into a narrow canyon; so narrow that a small waterfall drops into the center of the stream from overhanging cliffs. The river combines its flow with O'Neal Creek, Williams Creek, Weminuche Creek, Sand Creek and First Fork. The volume of water is continually increasing as the Piedra's southwesterly course twists and caroms off vertical rock outcrops of the valley sides. The segment below the bridge is the first to attract whitewater boaters.

   After several miles in the open valley, the river enters Second Box Canyon. Second and the First Box Canyons were formed where the river runs between two resistant precambrian rock formations. The cutting power of the river has only been able to deepen rather than widen the canyons. The box canyons are sheer vertical walled with major rapids. Below Second Box Canyons the valley opens at the confluence with the First Fork, but a short distance below the stream enters First Box Canyon. 1/ At the end of the chaos created by the First Box rapids, the stream runs swift until it reaches the last rapid at the confluence of Sheep and Indian Creeks.

1/ The boater runs into Second Box Canyon first and then First Box second. This incongruency is the difference between geographers working up stream when exploring and the boater floating downstream.

B. Methodology: Rivers Comparison

1. Data needed: The scientific literature supports the assumption that whitewater recreational use will increase on the Piedra. The San Juan National Forest currently has the opportunity to establish management objectives for recreation activities in the river corridor. To develop the assumptions of this study, the need to know and understand what was happening on other rivers is paramount. The process used was to determine which western rivers are similar to the Piedra, and then request use and management data from the agency managers for those rivers.

   To account for the presumption that wild and scenic river notoriety and study status was a cause for increased use, data requests focused on the study rivers in Sec. 5(a) of the Wild and Scenic Rivers Act as amended. The procedure was to identify rivers with approximately the same physical, management, and social character as the Piedra.

   Once sample rivers were chosen, the river managers were asked to provide data on use, management plans or informational literature for public dissemination.

2. Physical Comparison: A comparison was made between the Piedra and other western rivers named as study rivers by the Wild and Scenic Rivers legislation of 1968 and 1975. This comparison, based on the physical descriptors of the River Information Digest (Interagency Whitewater Committee, 1982), was made to identify which rivers might provide data that would closely fit the probable Piedra situation had it not been for the barriers to increased whitewater use.

   An attempt was not made to use the various assessment methods discussed by Chub (1977) to make the comparison because each of these methods require fairly extensive field observations. Appendix B displays the individual grouping sheets from the

The upper or Second Box Canyon starts shortly after the mouth of Sand Creek. The cliffs of the canyon rise 100 to 150 feet above the river and the valley is about 1000 feet deep. The lower or First Box Canyon has 400 foot cliffs and a 1400 foot deep valley. Through these box canyons, the river becomes very narrow (less than 20 feet wide in two places) and is constricted by innumerable large boulders. Second Box has two major rapids and the First Box has six.

The nearness of this segment to the Piedra's headwaters accounts for the erratic nature of the flow during the spring. Sudden cold snaps can shut off the water with barely a day's notice. Likewise, a couple of bright, warm spring days will release torrents out of the Weminuche Wilderness along the Continental Divide. Optimum water flow for whitewater boating on the Piedra River is between 1000 and 2500 cfs. Above 2500 cfs the river may be too dangerous for most enthusiasts, however, this is by no means an absolute limitation. Flows of over 3000 cfs should be attempted only by experts. This water level is considered dangerous. There are 19.5 miles of riffles and rapids between the launch and take out. This distance contains 37 identified riffles and 15 described rapids (see Appendix C). The international scale was used in rating the rapids. At 1000 cfs, there are two class I rapids, five class II, six Class III, and one each of classes IV and V. It should be noted that each of these classifications could increase by at least one degree of difficulty for every increase of 1000 to 1500 cfs. At flows above 3000 cfs, First Box Falls is a class VI.

4. Shoreline Impacts: There are a considerable number of small level meadows and shoreline areas that are ideal for camping. Presently, a study of the ecological condition of the river environment has not been undertaken. Evidence, if any, of environmental damage resulting from recreation activity is probably from fisherman traffic and large hunting camps.

The instant rivers in Section 3(a) of the Act were not included as sample rivers because they were popular rivers prior to passage of the act. Other rivers dropped from the comparison were rivers that the author had floated and clearly differed from the Piedra. The following rivers were eliminated:

...Yampa and Green, Colorado...These are much wider rivers with greater water volume. Both require expertise at the major rapids, but are not nearly as technical overall.

...Dolores from Slick Rock to Utah and from gateway to the Colorado River; Colorado and Utah...These reaches of the Dolores are much less technical, and the current is much slower.

...Colorado, Cataract Canyon and Fishers Towers; Utah...The Colorado is much larger and has long stretches of flat water between its rapids except for the millrace of Cataract Canyon. Cataract differs from the Piedra only in sheer volume of water, making the rapids much more formidable and dangerous. Cataract also does not have a twisting channel like the Piedra.

The river digest describes 113 western rivers or their multiple reaches. These descriptions list 43 reaches of the 20 western rivers that are designated as study rivers in Section 5(a) of the wild and scenic rivers legislation. The Table in Figure II displays the results of the comparison process.

One limitation of the comparison is the subjectivity of the descriptors used by the Interagency Whitewater Committee (IWC). This is accentuated by the subjectivity in the various river managers response to the IWC's questionnaires for information to be included in the Digest. For example, the Priest River favor-

Rivers Information Digest. Although the Digest descriptors were used in the physical comparison, some ideas were borrowed from Chub's listing of important inventory features. Heberlien, (1977), asserted that value judgments are also necessary in planning. The descriptors used in the comparative evaluation are based on the value judgments of what type of character or what river amenities attract the user from river to river.

The first descriptor used in the comparison is "type of craft" used on each river. The Piedra will accommodate small craft such as kayaks and nonmotorized rafts. These descriptors relate to Chub's basic river inventory item of "floatability." This evaluation immediately eliminated any study river that would accommodate motorized rafts or motor boats operating upstream. These types of craft indicate the rivers are indeed larger with greater volumes of water or less gradient, rocks or boulders.

Trip length was the second descriptor compared. This descriptor is not one of Chub's physical features, but nevertheless very important, because persons taking vacations or extended trips to run rivers will certainly consider trip length. Trip length, indirectly relates to Chub's inventory of dominant river patterns, stream velocity and fluctuation. Persons floating rafts would most likely take two days because of the extensive need for scouting rapids.

River difficulty is the third descriptor used in the comparison. This descriptor relates directly to Chub's inventory characters of water surface pattern.

The fourth descriptor was limiting low flows. This relates to the inventory features of river pattern, immediate bank height, and navigational obstructions.

FIGURE II

RIVERS COMPARISON

River or Segment	Year Desg.	1st. Desc.	2nd. Desc.	3rd. Desc.	4th. Desc.	# of other	# of like	# of like	# of like
American, N. Fork	1975	Not in Rivers Digest							
Toulumne	1975	yes	yes	yes	yes	2	2	1	1
Cache le Poudre	1975	yes	yes	yes	elim.				
Dolores (8)	1975	yes	yes	yes	yes	2	2	2	1
Dolores (11)	1975	yes	yes	yes	yes	2	2	3	2
Flathead (12)	1968	yes	yes	yes	elim.				
Flathead (13)	1968	yes	yes	yes	elim.				
Flathead (14)	1968	yes	elim.						
Flathead (15)	1968	yes	yes	elim.					
Flathead (16)	1968	yes	yes	elim.					
Flathead (17)	1968	yes	yes	yes	elim.				
Gunnison	1975	yes	yes	yes	elim.				
Missouri, Upper	1968	elim.							
Snake, (26)	1975	yes	yes	yes	yes	2	1	3	1
Snake, (27)	1975	yes	yes	elim.					
Snake, (28)	1975	yes	yes	yes	elim.				
Big Thompson	1975	Not in Rivers Digest							
Colorado, Westwater	1975	elim.							
Owyhee, S. Fork	1975	yes	elim.						
Rio Grande (21)	1968	yes	yes	yes	yes	2	1	2	1
Rio Grande (22)	1968	yes	yes	elim.					
Rio Grande (23)	1968	yes	yes	elim.					
Rio Grande (24)	1968	yes	elim.						
Bruneau	1968	yes	elim.						
Moyie	1968	yes	yes	yes	yes	2	0	1	2
Priest	1968	yes	yes	yes	yes	1	1	1	2
St. Joe	1968	yes	yes	yes	yes	2	1	1	2
Illinois	1968	yes	elim.						
John Day	1975	elim.							
Sauk (18)	1968	yes	yes	yes	yes	2	0	1	2
Sauk (19)	1968	yes	yes	elim.					
Sauk (20)	1968	yes	yes	elim.					
Skagit USFS	1968	yes	yes	yes	elim.				
Skagit NPS	1968	yes	yes	yes	elim.				
Suiattle	1968	1968	yes	yes	yes	3	0	1	1

ably compares to the Piedra River through the descriptors of the Digest. However, many differences are obvious when comparing the wild and scenic rivers reports for the two rivers.

3. River Managers Questions: The physical comparison among rivers resulted in ten rivers being sample rivers that should compare favorably with the Piedra. These rivers are the Toulumne, Two reaches of the Dolores, the Snake (26) also known as the Grand Canyon of the Snake, portions of the Rio Grande in Big Bend National Park, Moyie, Priest, St. Joe, Sauk (18), and the Suiattle.

   Data was also requested from six other study rivers. This data was needed to test any relationships or correlations that might exist with other study rivers that were originally named in the act (these were all 1968 rivers).

   Control data was requested for a third group of rivers. These rivers include original instant rivers, rivers later added as study rivers in the Wild and Scenic Rivers Act, or rivers that were never considered for federal classification.

   River managers were asked to provide use reports, management plans, and information publications or handouts. It was assumed that the information requested could provide: 1) curves for predicting future use on the Piedra, 2) that management plans providing a comparison with Region Two's Uniform Forest Management Prescription 10D and 3) information providing leads in expressing the management level needed to protect the river environment, as well as providing public safety, and monitoring use without infringing on the user's expectations.

for a three year period. All the statisticals methods provided by the HP-41 CV programs are also described in the statistical texts INTRODUCTION TO PROBABILITY AND STATISTICS, (Mendenhall, 1971) and WILEY SERIES IN PROBABILITY AND MATHEMATICAL STATISTICS (Draper and Smith, 1966).

The data for nine rivers were not used because the curve fitting resulted in a coefficient of correlation (R^2) of less than 0.70. Some comments received from the river managers indicated that the data were not complete enough to draw statistical conclusions. Some examples of the footnoted comments are:

> ..."The data for noncommercial users prior to 1981 are very rough estimates and therefore use figures prior to 1981 are not listed."
>
> ..."We don't keep floating records on the __, use is estimated to be __."
>
> ..." The above figures should be adjusted upward by 15 to 25 percent to include river users who failed to obtain permits."
>
> ...There was a drought and we did not monitor use."

The administrators perceived different reasons for the absence of uniform use patterns. For instance, it was noted that during dry years or drought years, use, both commercial and private, would decrease dramatically. Two rivers in California, the Stanislaw and Merced had no recorded use during 1977 because of drought. The upper Stanislaw provided an unusual observation of trend. Prior to 1981 use figures were on a roller coaster trend. During 1982, use decreased to zero because the new Melones Dam was completed. This supported the displacement comments of Lewis and March (1977).

C. Results: Data Summary

1. User Data Compared: If it were not for the untimely closing of the First Fork Road and the Emmert decision, it is assumed that whitewater use on the Piedra River would have increased at approximately the same rate that occurred on other study rivers named in the wild and scenic rivers legislation. Because of these two barriers, a history of user trends is not established. To adequately assess the management needs and potential for the Piedra River, some quantification of expected use is needed. The purpose of collecting user data was to project river use data from other rivers to indicate how much use can be expected on the Piedra River since the barriers to whitewater floating have been removed.

   Use data provided by other river managers was first tested with three curve fitting regression programs. These programs apply the least square method to original equations (straight line and logarithmic curve) and to a transformed equation (power curve). Once tested, all sets of individual river data providing a co-efficient of correlation of greater than .70 were carried forward into prediction curves for the Piedra. These programs are provided in the statistical pack sold by Hewlett-Packard for HP-41C and 41CV calculators.

   Data from the rivers were previously divided into three groupings: sample rivers, 1968 study rivers (other study rivers), and other rivers without regard to the wild and scenic rivers legislation. Figures III, IV, V, display the curves for projected river use increases of the three groupings. Through the use of the programs, the use for each grouping was projected out

FIGURE NO. IV
Regressions
Other Study Rivers

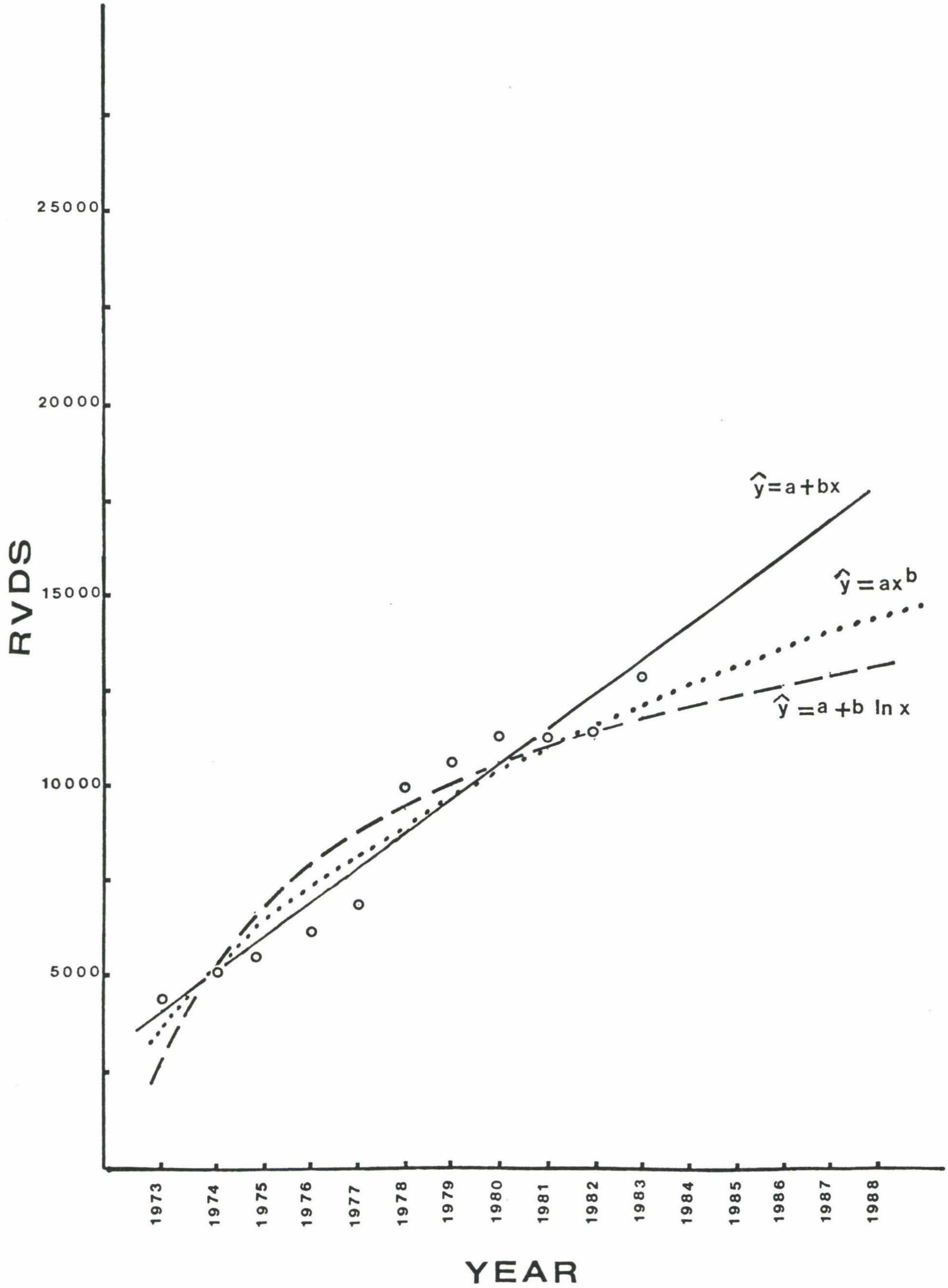
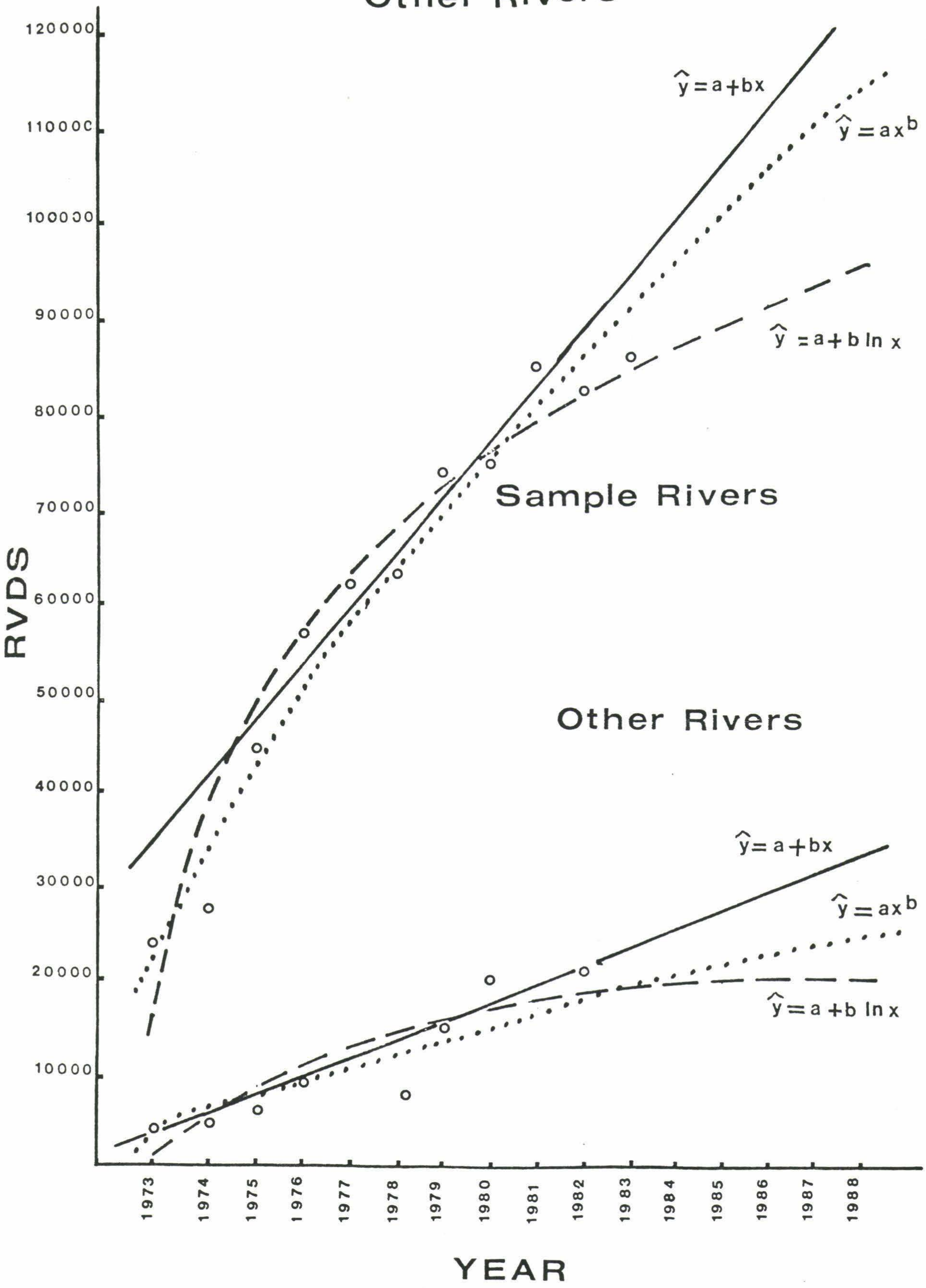


FIGURE NO. III
Regressions
Sample Rivers
And
Other Rivers



2. Uniform Forest Management Prescription 10D: Uniform Forest Management Prescription 10D was developed to guide management of established corridors for study rivers under Section 5(a) of the wild scenic rivers legislation. The prescription summary reads:

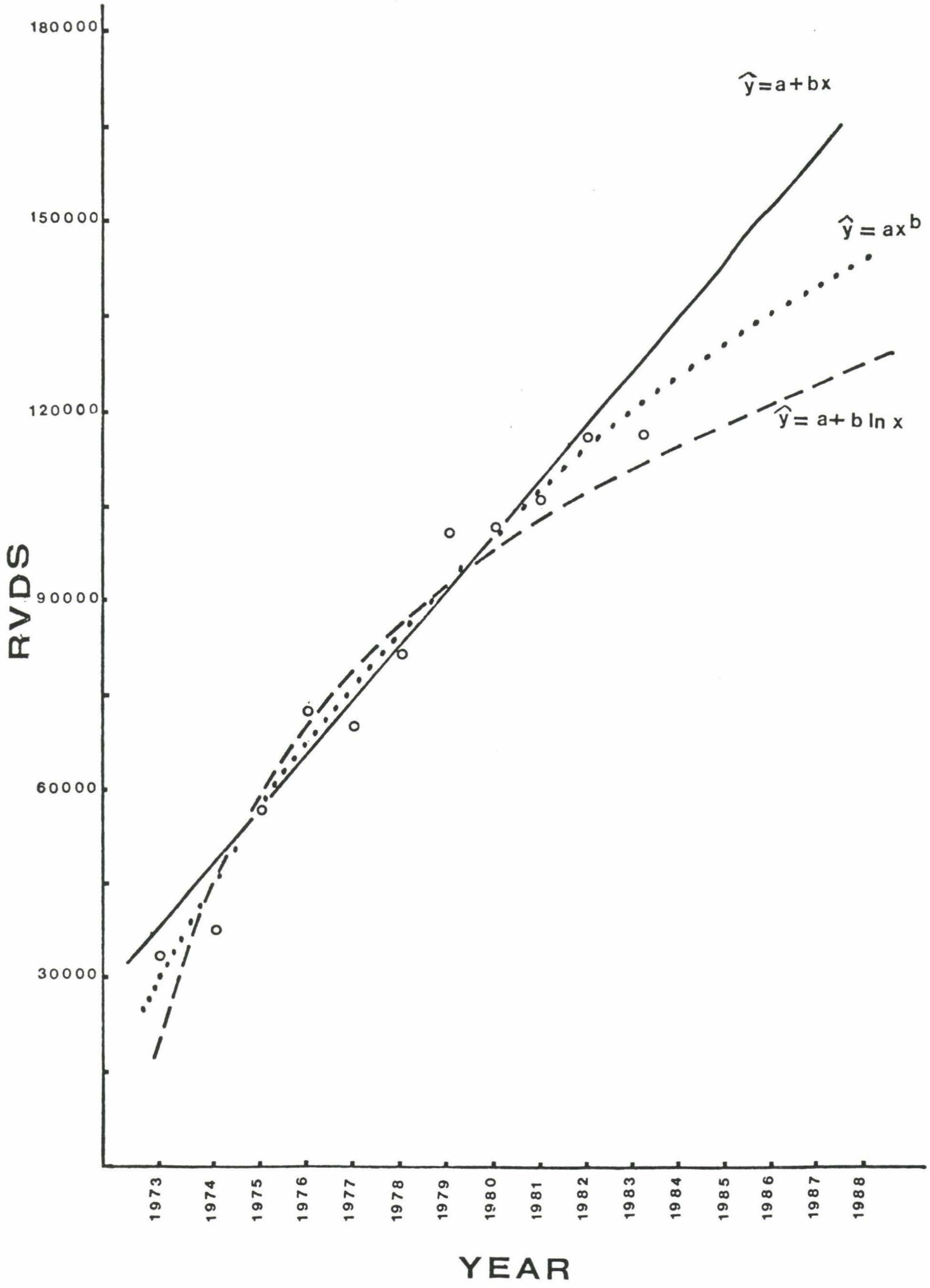
> "Management emphasis is on river segments designated as a component of the National Wild and Scenic River System and those recommended for designation. 'Wild Rivers' are managed to be free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and water unpolluted. 'Scenic Rivers' are managed to be free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible in places by roads. 'Recreational Rivers' are managed to be readily accessible by road or railroad and to maintain developments that may have occurred along the shoreline and impoundments or diversions that may have occurred in the past."

In the course of this study, the comparison of Prescription 10D with other approved management plans did not reveal any correlations. 1/ Indeed, there were many statements that could be construed to mean the same as many of the statements in the R2 prescription. However, because of wording and format, a relationship could not be established.

To better understand the allocations of the Land Management Plan and the resulting use coefficients, a general understanding of the ROS classification system as used in the R2 prescriptions is needed. Also, managers need to take into account that water surface or water based recreation gives as a primary pursuit the experiences gained through utilizing the actual water corridor as a transportation/recreation route (Johnson and Carothers, 1982).

1/ None of the management plans reviewed had formal management prescriptions.

FIGURE NO. V
Regressions
Summation
of
All Rivers



the lower point of activity appreciation. As the fishermen's skill and knowledge becomes greater, they ascend the scale of appreciation. This ascension is characterized at the top by the fisherman who can routinely catch fish with phony or artificial enticements.

While these philosophical gambits address quality of experiences they do not establish use coefficients. One thought to compensate for the absence of coefficients in the prescription was to apply the user levels developed for management units that the 10D corridor passes through. This simplistic solution is unworkable since the wild river portion of a prescription 10D corridor passes through a 5, 6, or 7 B prescription allowing for roads and intensive development, etc. In this example, the intent of the "wild" designation would quickly be lost. Figure VI displays the actual management areas that the 10D management area for the Piedra River passes through. Figure VII explains the ROS classes and their user coefficients that are contained in the management areas.

Two important distinctions must be made. First, the entire classification for this segment of the Piedra is proposed to be wild, except for a short section below Indian Creek, which is proposed as scenic. (The administration's proposal is not to include the reach proposed as scenic in the national rivers system). The second important distinction is that the San Juan National Forest Management Plan applies wilderness prescriptions in the river corridor in that portion of the corridor that passes through the Piedra Wilderness Study Area.

The wild section of a proposed classified river will have the same user coefficients as the wilderness allocation of 8C. Based on the most restrictive user coefficient, it appears that the maximum number of users on the river for any given day would be approximately 60 persons at one time.

Two broad viewpoints exist regarding the recreation opportunity spectrum. The first, we call horizontal, is the spectrum itself. The other viewpoint, for convenience, we shall refer to as the vertical spectrum. The ROS Users Guide (1982) details the entire process of the classification system, starting with the concept of a spectrum that extends from a most primitive end to an ending toward highly developed urban types of recreation. Included in the classification system is characterizations of activities, settings (physical, social and managerial), and experiences.

To define each of these characterizations, a number of physical criteria are used such as size, remoteness, land form, evidence of humans. The social setting is described as people densities along the spectrum from primitive to urban. The managerial setting reflects the amount and kind of restrictions which affect recreation opportunities placed on people's actions by the administering agency or private landowner.

The ROS classifications fit into the management plans through the management prescriptions. The ROS class generally establish outdoor recreation management emphasis, standards and guidelines for specific areas.

The vertical viewpoint is not so much applied in the planning process as it is in user philosophy. Wagar, (1960) described a hierarchal level of user enjoyment. This vertical stratification ranged from sensation on the bottom ...perception...intellectual...and husbandry at the top. In his studies on conflict resolution, Hobson Bryan, also makes a vertical distinction. In his specific studies on conflict between fishermen, he makes the point that bait fishermen and persons just starting are near

FIGURE # VII

User Coefficients For Management Areas Along the Piedra River Corridor

Prescription and ROS Classes		very low	low	moderate	high
03A	Semi-primitive				
	Nonmotorized				
	PAOT/mile (trails)	2	3	9	11
	PAOT/acre (area wide)	.004	.008	.05	.08
	Encounters	30/day			
05B	Roaded Natural				
06B					
07C	PAOT/mile (trails)	no maximum			
07E	PAOT/acre (area wide)	.04	.08	1.2	2.5
	SADT/roads	LI 0 to 20		LC 10 to 50	
	Semi-primitive				motorized
	PAOT/mile (trails)	2	3	9	11
	PAOT/acres (area wide)	.004	.008	.05	.08
	SADT/roads	LI 0 to 20		LC 10 to 50	
	Semi-primitive				non-motorized
	PAOT/mile (trails)	2	3	9	11
	PAOT/acre (area wide)	.004	.008	.05	.08
	Encounters	30/day			
08A	Primitive		(greatest		degree)
	No				Trails
	PAOT/acre (area wide)	.001	.002	.003	.007
	Encounters	2/day			
08B	Primitive		(largely		isolated)
	PAOT/mile (trails)	0.5	0.1	2	3
	PAOT/acre (area wide)	.002	.005	.01	.02
	Encounters	6/day			
08C	Semi-primitive Wilderness				
	PAOT/day (trails)	2	3	9	11
	PAOT/acre (area wide)	.004	.008	.05	.08
	Encounters	20/day			

FIGURE # VI
PRESCRIPTION/ALLOCATIONS FOR MANAGEMENT UNITS ALONG THE PIEDRA RIVER

Mile Post	Geographical Feature	Management Area on river's right side	River Corridor	Management Area on river's left side
2.6	Private land			
		3A	10D	3A
4.2	Piedra Wilderness Study Area Boundary			
		8A	8B	8A
8.2	Davis Creek			
		8A	8C	8A
10.5	First Fork			
		8A	10D	7C
11.2				
		8A	10D	7E
12.4				
		8A	10D	7C
12.9				
		8A	10D	6B
14.0	Above Sheep Cr.			
		8B	10D	6B
14.4	Below Sheep Cr.			
		8A	10D	6B
15.4	Indian Creek			
		3A	10D	6B
17.8	Elk Creek			
		3A	10D	5B
20.2	End River Segment at Colorado Highway #160			

FIGURE # VIII

MANAGEMENT DOCUMENTS

Analysis of Administrative Regulations

Administrative Regulations	Number of River Documents		
	User Requirement	Voluntary Action	No Constraint
Commercial Use Permits	15	---	---
Private User Permits	8	5	2
User Rationing	3	---	12
Party Size Limits	10 1/	---	5
Constrained use season	5	---	10

	Yes	No
Approved Management Plan	10	5
State and County Laws	6	9
Non-boating Laws	6	9
Other State Permits	6	9
Special River Maps 2/	5	10

1/ Most of the party size limitations constrain commercial operations.

2/ These maps identify and describe rapids and other information river recreationists need to know. Three of the maps reviewed were on waterproof stock.

3. Management of Whitewater Use:

(a) Information provided to the public:

A review was made of plans and other public information materials that were received for 15 western rivers. This review was to determine what information other river managers or agencies thought important, desirable or required to be included in their river management documents. This review was made without regard as to how a river may have matched the character of the Piedra. Material from all river managers was reviewed to determine what items could be potentially included in future publications by the San Juan National Forest. In this analysis there are two key administrative items intentionally lacking: legal opinion and statistical analysis base.

The plans and public handouts were reviewed to determine if various categories of administrative procedures, safety requirements, river corridor environment protection, and information and education attempts without regard to subject. Each of these categories had a number of items. These specific items were added as they appeared in the documents being reviewed. Figures VIII through XI display the results of this review.

An effort was made to see if there is any correlation between the amount of information provided and the existence of an approved management plan. No statistical correlation could be determined. Figure XII displays the results of this analysis.

FIGURE # X

PUBLIC INFORMATION & MANAGEMENT PLANS
ANALYSIS OF CONTROLS FOR ENVIRONMENTAL PROTECTION

Environmental Protection Items	In number of Plans				
	Prohibited	Required	Suggested	Provided	No mention
Fire and Cooking					
Fire Pan	***	5	8	***	2
Liquid Fuel Stoves	***	---	10	***	5
Agency Facilities	***	***	***	4	11
Rock fire Circles	7	***	4	***	4
Carry out ashes	***	4	4	2 1/	5
State	or				Federal
Fire Permits Required	***	5	***	***	10
Human Wastes (excretement)					
Carry out (porta-potti, or ammo-can)	***	2	3		10
Optional shore Latrine or carry out	2	---	9	---	4
Shore toilets installed	***	***	***	3	***
Solid Waste					
Pack it in/pack it out	***	10	3	***	2
Garbage Burial	10	***	1	***	4
Soap and Detergents	6	***	3	***	6

1/ Two rivers provided agency and volunteer crews to clean grates and carry out ashes from campsites where fire grates were provided at designated campsites.

FIGURE # IX

PUBLIC INFORMATION & MANAGEMENT PLANS

ANALYSIS OF SAFETY INFORMATION

	In number of plans		
Safety Item	Requires	Recommended/ Suggested	no mention
Personal Flotation Device	13	2	---
First Aid or Wilderness Survival Kit	7	6	2
Bailing Bucket	6	5	4
Patching Kit	7	6	2
Spare oars and paddles	12	---	3
Rescue rope	7	2	6
Floater Skills			
(commercial)	15	---	---
(private)	---	11	4
Craft size and type	4	10	1
Helmets	3	1	11
Wet suits	---	1	14
I & E Safety Suggestions			
Shoreline or non-river hazards	***	5	10
Drinking water safety	***	6	9
Warning on strainers and trees	***	4	11
Warning on high water trips	***	5	10
Boat loading safety	***	8	7
Water level data available	***	8	7

FIGURE # XII
ANALYSIS OF INFORMATION ACTIVITIES ON RIVERS WITH APPROVED MANAGEMENT PLANS

Rivers with approved management plans.	Agency	Safety Items (17)	Environmental Protection Items (10)	I & E Items (17)
Skagit	NPS	8	4	3
Dinosaur (Green & Yampa)	NPS	5	7	4
Flathead	FS	10	4	11
Selway	FS	8	5	12
Owyhee	BLM	9	8	7
Upper Missouri	BLM	5	7	10
Salmon, Middle Fork	FS	12	8	15
Average of items backed by approved plans		57	43	62
Average of items in documents not supported by approved plans.		52	25	29
Percentage of total possible.				
Documents with approved plans.		47.8%	61.4%	52.1%
Documents without approved plans.		43.6%	35.7%	24.4%

FIGURE # XI

INFORMATION AND EDUCATION DOCUMENTS
Information Analysis

Subject	Number of River Documents			
	Advise with Explanation	Advise without Explanation	Merely Mention	No Mention
Minimum Impact camping				
Sanitation	3	---	3	9
Wildfire	2	6	4	3
Fire use	2	9	2	2
Soap & Detergent	1	5	3	6
Protecting Vegetation	4	---	9	2
Campsite quality	5	2	5	3
Access Routes	***	7	***	8
Archaeological Restrictions	***	8	***	7
Non-river Points Interest	***	2	***	13
Boating Safety	***	5	***	10
Environmental Education				
Geology	***	2	***	13
Wildlife	***	7	***	8
History	***	4	***	11
Other Recreation	***	3	***	12
Clothing and Equipment	***	7	***	8
Private Land Rights	***	8	***	7
Other Information Sources	***	7	***	8

Only five rivers managed by Federal agencies had water flow gauges. This is rather surprising since knowledge of river level should be a prerequisite in deciding whether or not to launch. The U.S.G.S. maintains a recording gauge on the Piedra River near Arboles. River runners cannot use current data from this gauge since the record is retrieved at the end of each month.

(b) User Constraints:

Other than safety requirements, there are very few user constraints identified in the various river management documents. Popular western rivers such as the Selway, Middle Fork Salmon, Green and Yampa, and the Colorado in the Grand Canyon have established visitor rationing with the ever present problem of allocating the available permits between the outfitted and the nonoutfitted public. In most river management schemes where user limits occur, rationing is the result of environmental considerations and campsite availability rather than specific user preference for an experience of solitude.

In the case of the Piedra, a tentative thought is that user rationing is not needed at this time. However, this assumption is made based upon several years of inactivity by river floaters and the lack of on-site study of camping area conditions along the river.

4. Facilities Provided: The river management plans and public handouts did not identify specific facilities. Most documents discussed facilities in collective terms such as "launch site," "takeout point," "campsites," and "routes to and from." Review of the plans indicated that those rivers where user limitations are implemented generally have more developed sites and facilities. Although, in the case of most Federally administered rivers, most facilities and sites are in low development classes providing only roads to and from the river, parking space to unload equipment, and area to rig boats, and sanitation facilities.

DISCUSSION

CHAPTER IV

2. What Does the Public Think? Leading river administrators during the 1970's stated the case that managers needed more research and other information to assist in river planning efforts (Lewis and Marsh, 1977). In 1980, Leatherberry wrote, "In deciding whether to accommodate some activities, managers have been limited because they could not adequately assess the feelings of various people toward proposed policies." The point argued is that managers are confronted with myriad problems, complex, sensitive issues, as well as the need to make decisions without adequate resource and user data.

This study does not seek out public input in a formal sense. During the various administrative studies and planning efforts that have occurred on lands along the Piedra River during the past decade, the San Juan National Forest continued an ongoing forum for public involvement. To really delve into what management aspects are needed on the Piedra River, there must be an understanding of what the public has "said" in the past.

Most planning efforts involved land and resource allocations, and as expected, the majority of public comment was concerned with broad land and resource allocation issues. The usual form of polarity existed in all the planning efforts. In spite of the polarity of the allocation issues, there were a few comments on specific management considerations for whitewater recreational use. The following comments were made during the wild and scenic river study on the management of boaters on the Piedra River:

> "It is not the responsibility of the Forest Service to determine whether a river can or cannot be safely boated by an individual. Safety is a function of the individual's experience and ability and the level of the water. The responsibility of the Forest Service is to disseminate accurate information to aid the boater in deciding whether to attempt a particular stretch of river."

IV. DISCUSSION

A. Framework for Analysis

1. Assumptions Throughout this analysis we assume that whitewater boating on the Piedra will continue to increase and at some future point, the Forest Service will have to manage boating use to ensure that no degrading effects occur to the river environment. Also, as boater use increases, conflicts between individual boating parties, parties using different types of crafts, and between boaters and shore fishermen will increase.

Other assumptions in the analysis framework for this study are:

...The Congress will act to create a Piedra Wilderness based on the Forest Service determination that the area is suitable, capable, and available for wilderness.

...The United States Congress will act to include the recommended portions of the Piedra River in the National Wild and Scenic Rivers System.

...Management prescriptions and management units of the San Juan Land and Resource Management Plan will be upheld in all administrative appeals and court actions.

...Rivers in Colorado will receive more intensive use in the future. This is valid in spite of the possibility that Colorado Legislators may pass legislation making the surface of state streams a "premise" of private land owners. Passage of this proposed legislation will cause a profound shift of boater use to rivers that have very minor amounts of private land such as the Piedra.

B. What the Study Findings Indicate

1. Predicted Use For the Piedra River: Had the Piedra River not sustained the barriers to user growth in whitewater boating, use patterns would be well established. Chapter III discussed the analysis of the user data collected for other managed rivers in the western U.S.. Figures XIII through XV display how the use reported from other rivers appears on projection curves. The curves developed first in section three were replotted to bring them to a common scale for comparing the four river groupings by regression formula. The curves from the three regressions bear the same relationship in shape and bounds. The curve for the summation of all use delineates the upper limits of potential projections.

   An interesting key to understanding use trends is the difference between the sample study rivers, all named as study rivers in the 1975 act, and the other study rivers being designated as such in the 1969 act. The curves suggest, but not necessarily prove, that by 1975 whitewater boaters had made the distinction among rivers as to whether or not they were of wild and scenic caliber. The steeper slope of the curves for the 1975 rivers suggests that these study rivers were subjected to increased use because of the act. The general increase in the sport also probably helps to steepen the slope of the curves.

   In projecting use on the Piedra, the logarithemic curves were dismissed because of low R^2 values. Figure XVI replots the remaining regression curves. Curves from the original sample rivers are used to complete the projection. The curves resulting from the summation of all the rivers and the other study and control rivers are displayed only to show lower and upper bounds for projections based upon the data.

> "Although development controls may be needed along the river on private lands, we believe that such restrictions are the perogative of, and should be generated by local government and not mandated from Washington, D. C.."
>
> "We, therefore, have no objections to the proposed river designations, as presented in the report, as long as the proposed management of this reach of the Piedra River will not prohibit the State of Colorado from enforcing all applicable state water statutes."
>
> "Strict controls will have to be placed on white water boating to maintain public safety. Instead of strict controls, ample warning should be used (possibly in the form of signs strategically placed, for instance, near the Piedra Bridge 631, First Fork Bridge, and near the Lower Piedra Campground. Information regarding the possible level of difficulty should be made available for easy dissemination. I disagree that access and take out points for whitewater boating need to be developed to the tune of $34,250. Simple access and take out clearings should be all that need be required."
>
> "We definitely disagree with your plan to install boating facilities, i.e., take out points."
>
> "We are strongly against agency limitations on river use based on public safety."
>
> "We suggest the agency forget about user controls and install a usable staff gauge to provide water level information."

If this segment of the Piedra River is included as a component of the national rivers system, a management plan will be required. This additional planning effort will also include another formal procedure to seek out public comment.

FIGURE NO. XIV
Log Regression Curves

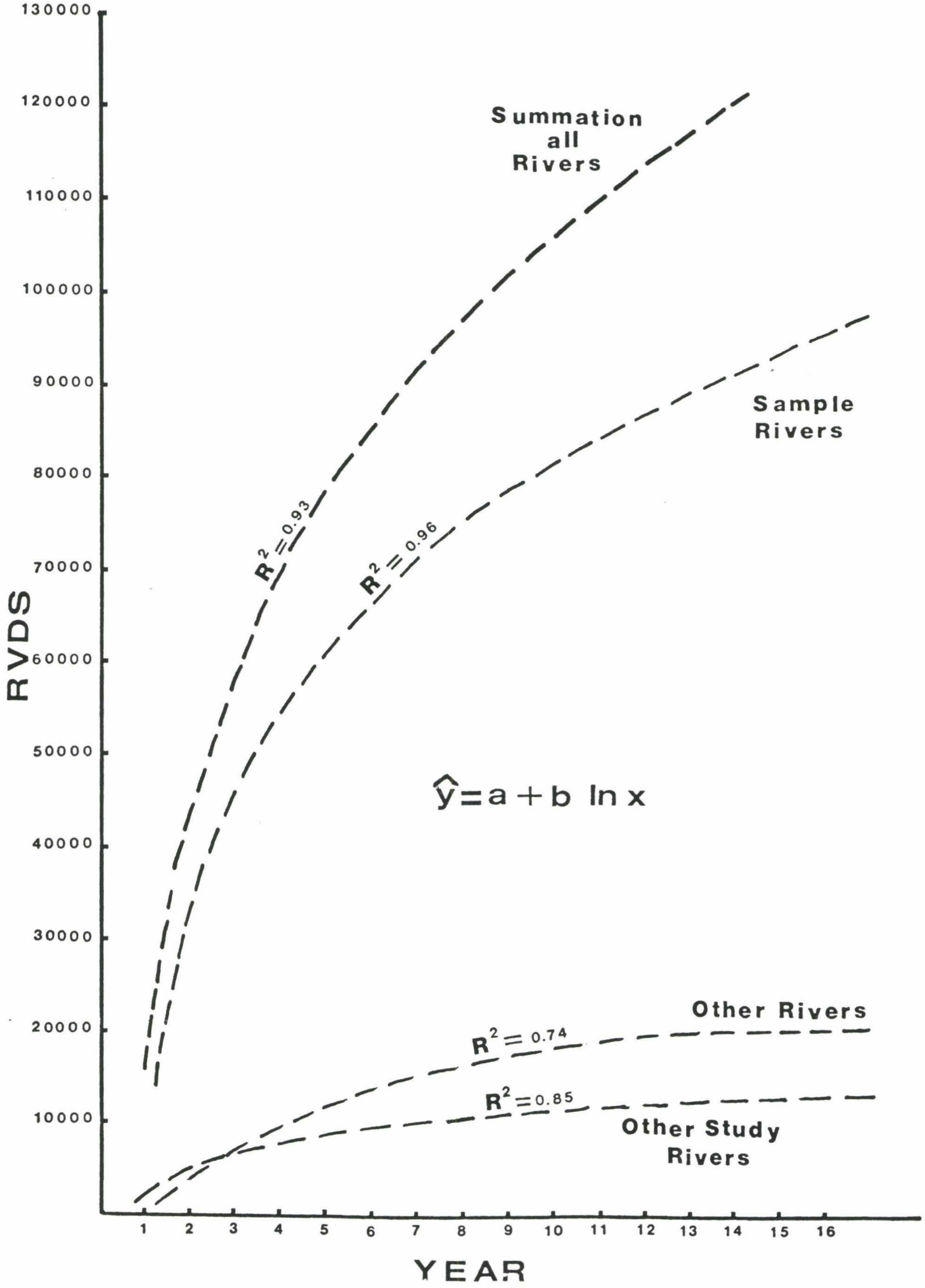
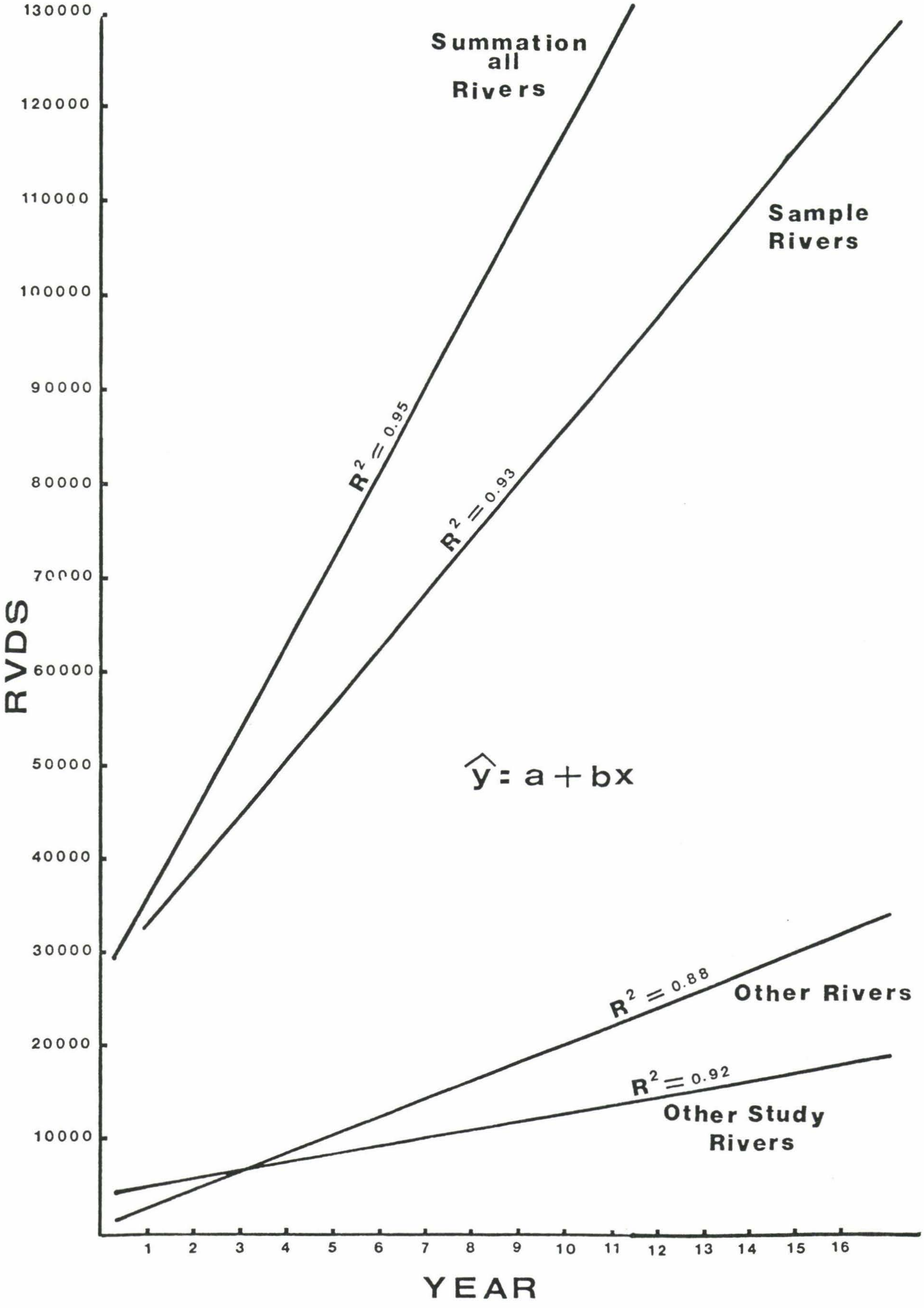


FIGURE NO. XIII
Linear Regression Plots



In Figure XIV the RVD values are not given on the y axis. This is because the San Juan National Forest does not have a reliable measure of use for a starting point. For instance, if the estimated use for the 1983 season were 100 RVD's, the curves project that use by 1996 would be between 860 and 930 RVD's. If the actual 1983 use was increased twofold or even tenfold, projected use would be correspondingly larger. One limitation is not having actual 1983 use records, another is not knowing the effect of the four year hiatus of river use because of the road closure and the Emmert case.

Figure XVII lists the anticipated whitewater use increases for the Piedra River. The reasons for the expected increases can be attributed to many causes. Some new users will alter their past preferences for other rivers because of what they perceive to be unacceptable conditions on other rivers (Leatherberry, et al., 1980). There could well be a shift to the Piedra from other rivers such as the lower and upper San Juan and Arkansas because of crowding. Leatherberry and his colleagues, in 1980, predicted that some recreationists will shift to lesser used rivers while others may stop participating in the activity altogether. An increasing interest in commercial potential is predicted. As limits began to be placed on use of the better known and more popular rivers, commercial and private runners alike will begin looking around for the use of other lesser known rivers (Mak, Jensen, and Hartman, 1977). There is already one commercial permit on the lower Piedra River.

The parallel that exists between Anderson's study of the Boundary Waters Canoe Area Wilderness and river use also exists on the Piedra (Anderson, 1981). In her study, she concludes, "Beginners, moderately experienced wilderness users, and

FIGURE NO. XV
Power Regression Curves

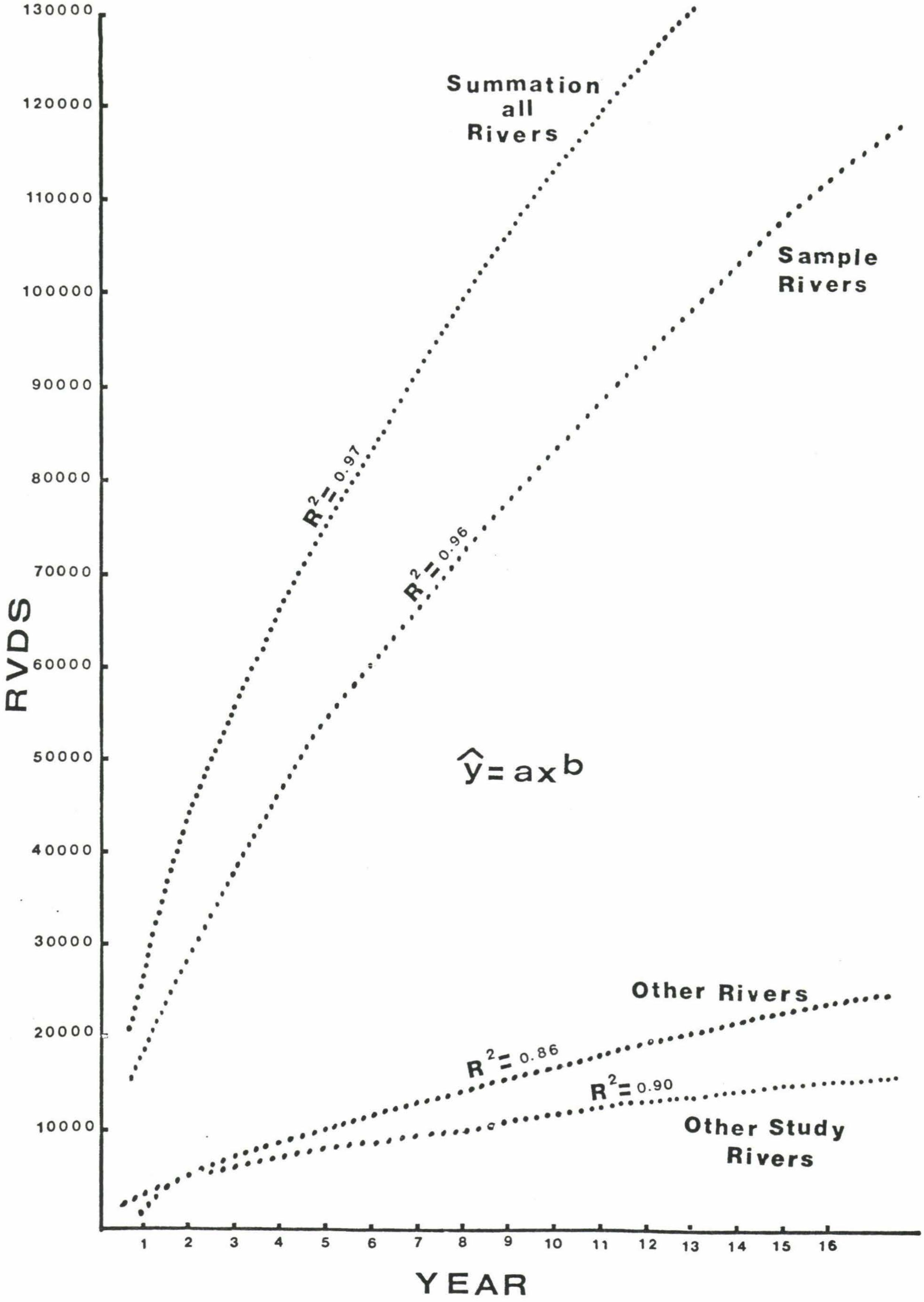


FIGURE XVII

Expected Whitewater Boating Use
Piedra River

YEARS	1(1983)	2	3	4	5	6
Low RVDS	100	160	220	280	340	390
Annual Increase	---%	60.0%	37.5%	27.3%	21.4%	14.7%
High RVDS	100	200	300	380	450	510
Annual Increase	---%	100%	50.0%	26.7%	18.4%	13.3%

YEARS	7	8	9	10	11	12
Low RVDS	440	510	560	620	680	740
Annual Increase	12.8%	15.9%	9.8%	10.7%	9.7%	8.8%
High RVDS	550	630	680	730	780	840
Annual Increase	7.8%	14.5%	7.9%	7.4%	6.8%	7.7%

YEARS	13	14	15	16
Low RVDS	800	860	910	970
Annual Increase	8.1%	7.5%	5.8%	6.6%
High RVDS	880	930	980	1030
Annual Increase	4.8%	5.7%	5.4%	4.1%

FIGURE NO. XVI
Projected Use

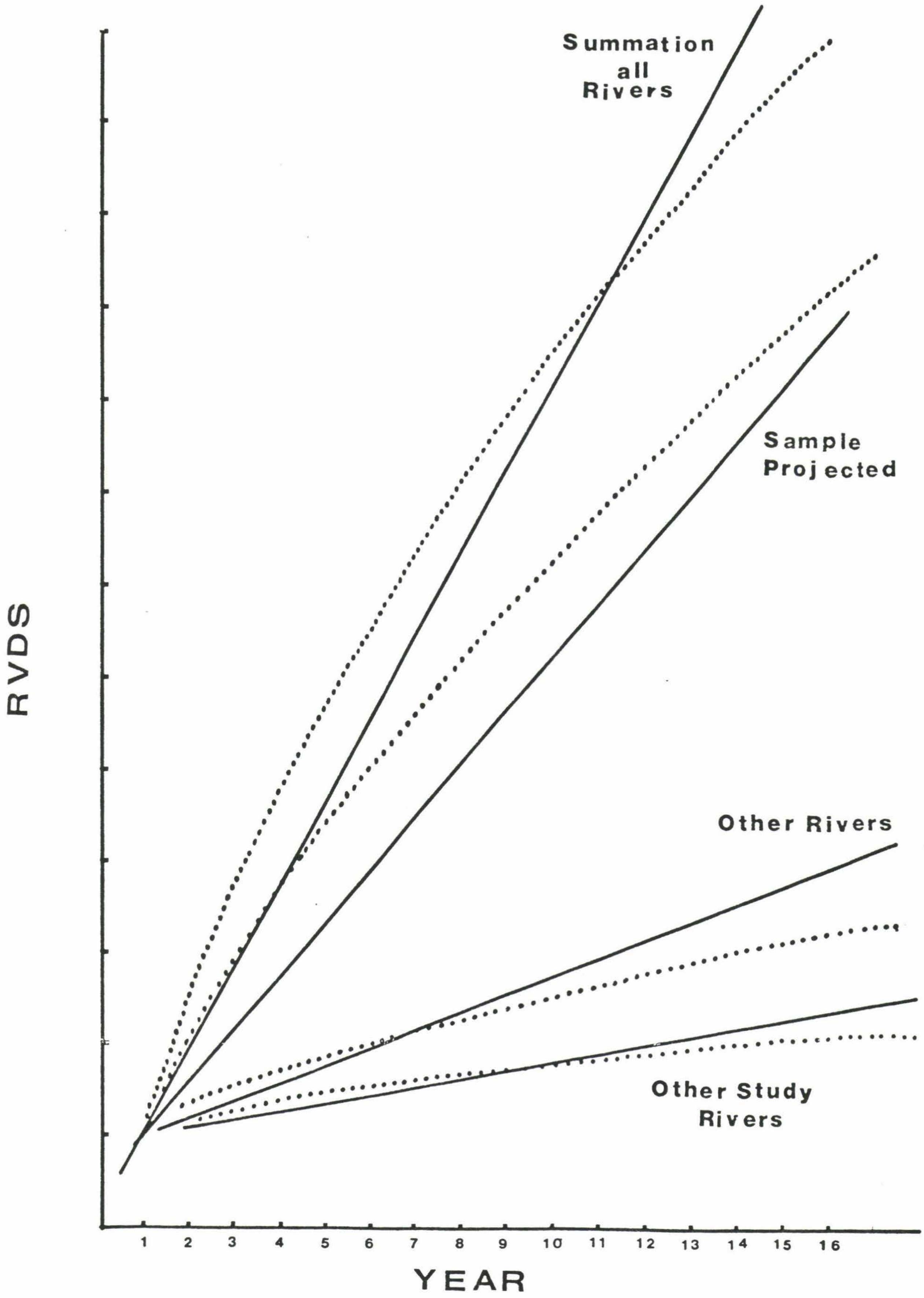


FIGURE #XVIII

PRESCRIPTION ALLOCATIONS

FOR MANAGEMENT UNITS

ALONG THE PIEDRA RIVER

Mile Post	Geographical Feature	Management Area on rivers right side	River Corridor	Management Area on Rivers left side
2.6	Private Land	3A	10D	3A
4.2	Piedra Wilderness study Boundary	8A	8B	8A
8.2	Davis Creek	8A	8C	8A
10.5	First Fork	8A	10D	7C
11.2		8A	10D	7E
12.4		8A	10D	7C
12.9		8A	10D	6B
14.0	Above Sheep Cr.	8B	10D	6B
14.4	Below Sheep Cr.	8A	10D	6B
15.4	Indian Creek	3A	10D	6B
17.8	Elk Creek	3A	10D	5B
20.2	End River Sgment at Colorado Highway 160			

veterans were equally likely to change from high-use entry points to either moderate or low-use entry points in the BWCA." This supports the contention that boaters being displaced will seek other rivers with less use than the river they are being displaced from.

The Piedra situation points to the conclusion that whitewater use will continue to increase now that the river is reopened to boaters. To adequately monitor the use, the San Juan National Forest needs to initiate use sampling that will provide an accurate count of the whitewater boaters.

At present, there does not appear to be any basis for a prediction of overuse or conflict between the river users and the trail or land surface users.

2. Uniform Forest Management Prescription 10D: In several areas the river corridor passes through management areas allocated to semi-primitive motorized and roaded natural. These roaded allocations do not fit or match and are inconsistent with the proposed river designation of wild under the Wild and Scenic Rivers Act. In these areas the river corridor is unroaded except at the First Fork Bridge. Figures XVIII and XIX show the complexity of the management units involved with the 10D corridor and the user coefficients resulting from the variety of management areas.

   The figures verify the counter thought that user coefficients of the surrounding management units cannot be used to determine user density in the 10D corridor. For instance, figure XVI displays several areas where 10D is bounded by 08A wilderness on one side and a 07E timber prescription on the other. Again, the choice of user coefficients from either management unit would at best be a guess if not completely arbitrary.

To determine or at least establish a basis for developing user coefficients, we need to look at the guideline for wild and scenic rivers. The USDA-USDI guidelines originally adopted, February 1970 and revised in final September 7, 1982, do not describe a wild segment with the same restrictions as wilderness. The final revision describes a wild segment as:

> "(1) Wild river areas--Those rivers or sections of rivers that are free to impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America."

These criteria are further interpreted as not the same as wilderness. In the discussion in the Federal Register, the framers continually use key terminology of "Generally...essentially primitive"... "will show little or no"...indicating that absolute purity is not the objective. Through all the regulations and guidelines, it is apparent that the "wild" in wilderness is not the same "wild" as in wild and scenic rivers. 1/

The idea of degrees of wildness is obvious in both the case of wild and scenic rivers as well as in wilderness (Nash, 1980). Nash's article intoned that the wilderness user could easily see the degrees of wildness where as the wilderness manager could not. We disagree with Nash. The various wilderness management prescriptions used in the Rocky Mountain attests that the difference in "wildness" has not escaped the manager. Although this thought proposed by Nash had to do with wilderness, there is a striking analogy with rivers. The degrees of wildness or dif-

---

1/ When the Colorado Congressional Delegation held Statewide hearings on Colorado wild and scenic rivers proposals in Durango, the Senators kept using the terminology that the "wild" in wild and scenic rivers is not the same "wild" as in wilderness. Later before full committee former Senator Dominick used the same language.

FIGURE # XIX

User Coefficients

For

Prescriptions Along The Piedra River Corridor

Prescription and ROS Classes		Very Low	Low	Moderate	High
03A	Semi-Primitive				
	non-Motorized				
	POAT/MILE (Trails)	2	3	9	11
	POAT/Acre (Area Wide)	.004	.008	.95	.08
	Encounters	30/day			
05B		Roaded			Natural
06B					
07C	POAT/Mile (Trails)	no			maximum
07E	POAT/Acre (Area Wide)	.04	.08	1.2	2.5
	SADT/roads	LI 0 to	20	LC 10	to 50
	Semi-Primitive				
	Motorized				
	POAT/mile (trails)	2	3	9	11
	POAT/Acres (Area Wide)	.004	.008	.05	.08
	SADT/Roads	LI 0 to 20		LC 10	to 50
	Semi-primitive non-motorized				
	POAT/mile (trails)	2	3	9	11
	POAT/acre (Area Wide)	.004	.008	.05	.08
	Encounters	30/day			
08A	Primitive (greatest degree)				
	No Trails				
	POAT/acre (Area Wide)	.001	.002	.003	.007
	Encounters	2/Day			
08B	Primitive (largely isolated)				
	POAT/mile (Trails)	0.5	0.1	2	3
	POAT/acre (Area Wide)	.002	.005	.01	.02
	Encounters	6/day			
08C	Semi-primitive Wilderness				
	POAT/day (Trails)	2	3	9	11
	POAT/acre (Area Wide)	.004	.008	.05	.08
	Encounters	20/day			

Most floatable segments of the Piedra could go into classified wilderness. This presents no problem. Management would then resort to the most stringent regulations. Any of the ROS classes found in the wilderness prescriptions would apply. We conclude that the Piedra River corridor (prescription 10D) between FDR #631 and Colorado Highway #160 be managed for semi-primitive nonmotorized recreation opportunity.

3. Managing Whitewater Recreation: In 1977, Mak, Jensen, and Hartman wrote that managers respond to use problems by establishing interim use limits, initiated research or study, commence gathering public input, and then developed more complete management plans on the basis of second and third items. They point out that in the case of most western rivers, managing agencies did not initiate action until heavy user impact occurred and general degradation of the environment had set in. This begs further investigation.

The most common theme currently being emphasized as a means by which effective mitigation of impacts can take place implies a "plan ahead" attitude toward recreation management (Johnson and Carothers, 1982). Although these authors make a strong pitch for protection of riparian vegetation, the analogy with all river management aspects is obvious. In their paper on riparian/recreation relationships, they continually emphasize the importance of preplanning to avoid impacts to the various components of the riparian area resources, whether they be vegetation, wildlife, soils, etc.

The Forest Service tradition of letting the recreationist alone to his own devices with a minimum of control has led to a strong emphasis on freedom of choice for the user (Washburne and Cole, 1983). Restrictions have generally been applied only after significant resource damage and loss of solitude have occurred. In the case of the Piedra, with the absence of serious levels of whitewater use, there is little resource or environmental damage that can be attributed to the whitewater boater.

ference in river corridors lend themselves to a type of classification of river difficulty or type of experience that can be made within the borad ROS classes that are used in the Forest Land and Resource Management Plan.

Carrying capacity is also taken into account. A related definition of carrying capacity is "the character of use that can be supported over a specified time by an area developed at a certain level without causing excessive damage to either the physical environment or the experience for the visitor." Lime and Stankey (1971) developed this definition under the assumption that the principal goal of recreation management is to maximize user satisfaction consistent with certain administrative, budgetary, and resource constraints. Although this definition deals with carrying capacity, it is a fundamental stepping stone for ROS classification. To prevent use levels from exceeding an unknown...undecided carrying capacity, the manager needs management prescriptions that pronounce and establish acceptable user levels.

In view of the fact that the "wild" in wild and scenic rivers is not the same "wild" as in wilderness, it can be argued that a wild river could be managed under ROS class semi-primitive non-motorized. If a rare occasion of a road crossing the corridor should exist, the ROS class would be semi-primitive motorized. On the Piedra River, one such occurrence is at the location of the First Fork Bridge. The segment was found to be eligible for wild because the road entered the river corridor, crossed the bridge and ended. In the absence of through traffic, and the primary purpose of the road being to serve the recreationist, the Wild and Scenic Rivers study report defined a case for leaving the segment as wild. This avoided excessive segmentation under the classification format.

Another important purpose of user information is to produce changes in user behavior desired by the managers (Lime, 1975). If the user is well informed of what to expect and what is expected, the resulting recreational experience will probably be worth repeating. Knopf, (1982), pointed out that orientational information, regardless of its source, is an important ingredient for a quality river experience.

In his study published in 1982, Knopf ranked insufficient information as the sixth most serious problem perceived by his sample population. He strongly stated:

> "Insufficient information constitutes the sixth-ranked problem area. Our questionnaire actually included three separate items relating to this theme. They were (1) Insufficient information about things to do in the area, (2) Inadequate brochures showing map of river, hazards, access points, etc., and (3) Inadequate information services (signs, displays) at put in points."

Knopf's findings were substantiated by the report of the Outdoor Recreation Policy Review Group (1983). As a barrier or obstacle to outdoor recreation participation, the lack of information ranked behind only lack of time and lack of money.

A wide variety of emphasis exists in the information provided to the user and public. The review of the other river plans and brochures indicates that some agency managers provide as much information as possible while some only emphasize safety. On rivers where user rationing exists, the public brochures seemingly are more complete in containing useful information about the country and environment being traveled through as well as emphasizing safety, rapid descriptions, and restrictions. Figures IX and X on pages 40 and 41 show what informational items are emphasized.

The Piedra River is a paradigm of the thoughts of two leading research scientists. "As a general strategy, I would urge that the indirect, more subtle types of controls be tried and evaluated first before the more authoritarian heavy handed kinds of actions are pressed into service" (Lime, 1975). Robert Lucas echos those thoughts. He contends that close calls should go to nonregulatory approaches. "The burden of proof should be on the need for the regulation" (Lucas, 1982).

The Piedra River, indeed, does not require a myriad of administrative controls. Until whitewater use increases to the point that conflicts between users and environmental degradation are inevitable, management should take a soft or benign management approach. Indirect controls, will forestall or put off the day that direct controls will have to be initiated for quite some time. If direct controls are needed, they should not interfere with an individual's freedom of choice (Lime, 1975).

Two soft or indirect controls are worth discussing: user information and safety.

(a) A Public Information Program: The best method of indirect control is to develop a good public information program. Information to the public should satisfy two needs. Schreyer, 1983, lectured that the most important period when information is needed is what he termed as the period of building the commitment or deciding to go. We submit that most whitewater boaters probably have sufficient information on most rivers to have built the commitment. Where they probably lack information is during the period that they are developing their expectations.

> "What begins to emerge is a picture of risk sports characterized by the total involvement of the individual. Not only are the senses heightened and the emotions aroused, but everything is focused toward the successful culmination of the experience. The person can put his or her whole being into it, thereby moving some degree of self-actualization through the activity. What we are talking about is not so much a death wish as an enhancement of existence through oneself at the edge of life."

Other scientists take a more pragmatic viewpoint. The manager must realize the importance that high risk recreational activities provide to those seeking to escape the stresses of everyday life (Schreyer et al., 1976, Nielson, 1978, and McCool and Utter, 1981). It's also suggested that people in risk-taking situations are motivated by either a motive to achieve or a motive to avoid failure (Atkinson, 1958, Haas, 1979). In the publications reviewed during this study, most river managers discuss safety and provide warnings on river hazards in spite of what the research literature contends...or where the philosphers are leading.

The review of the various publications that were submitted for this study indicates that most managers will not make judgments on boater or equipment capability. They do, however, require or suggest that certain safety equipment is available. These safety items simply make good sense and such pronouncements do not cause the transfer of liability. Figure IX in the preceding chapter displays the safety items that managers emphasised in public information. The review indicates that most of the effort to promote safety is directed at commercial outfitter/guides.

It is reasonable to conclude that the managing agency should remind all whitewater users of basic safety practices. This can be accomplished without infringing on the "right to die" argument or any other avant-garde concepts.

The subject of user information can only be summarized by indicating its utmost management importance. The conclusion that the most important task of managing whitewater use on the Piedra River is not to place limiting controls on the users, but to make them well informed and provide timely information to aid in their decisions to launch or not.

(b) User Safety: If the manager wishes to elicit the most keen emotional outbursts, all he needs to do is tell experienced whitewater boaters that the river is either unsafe or above the boaters' ability. Better yet, tell the boater he cannot launch because his equipment is insufficient.

Schomaker summarily comments on the work of Leatherberry, et al., 1981, Rankin, 1980, and Lucas, 1982 by writing that public land managers face a dilemma. "They are charged not only with providing for the health and safety of the visitor, but also with providing the opportunity for a satisfying recreation experience." In his discussion he indicates that floaters seeking risk do not favorably view possible safety measures because they remove the opportunity to experience risk. He writes:

> "In retrospect this is reasonable, given that in whitewater boating the excitement, and risks, come at the moment the canoe, raft, or kayak is in the rapids. How a person behaves at that particular moment...the path chosen...determines the amount of risk. The control rests with the floater and is independent of signs, numbers of patrols on the river, enforcement of the rules, and whether first-aid equipment is in the boat."

The extreme viewpoint is quoted in an article promoting the concept of no-rescue wilderness (McAvoy and Dustin, 1983). They quote (Schreyer, White, and McCool, 1968):

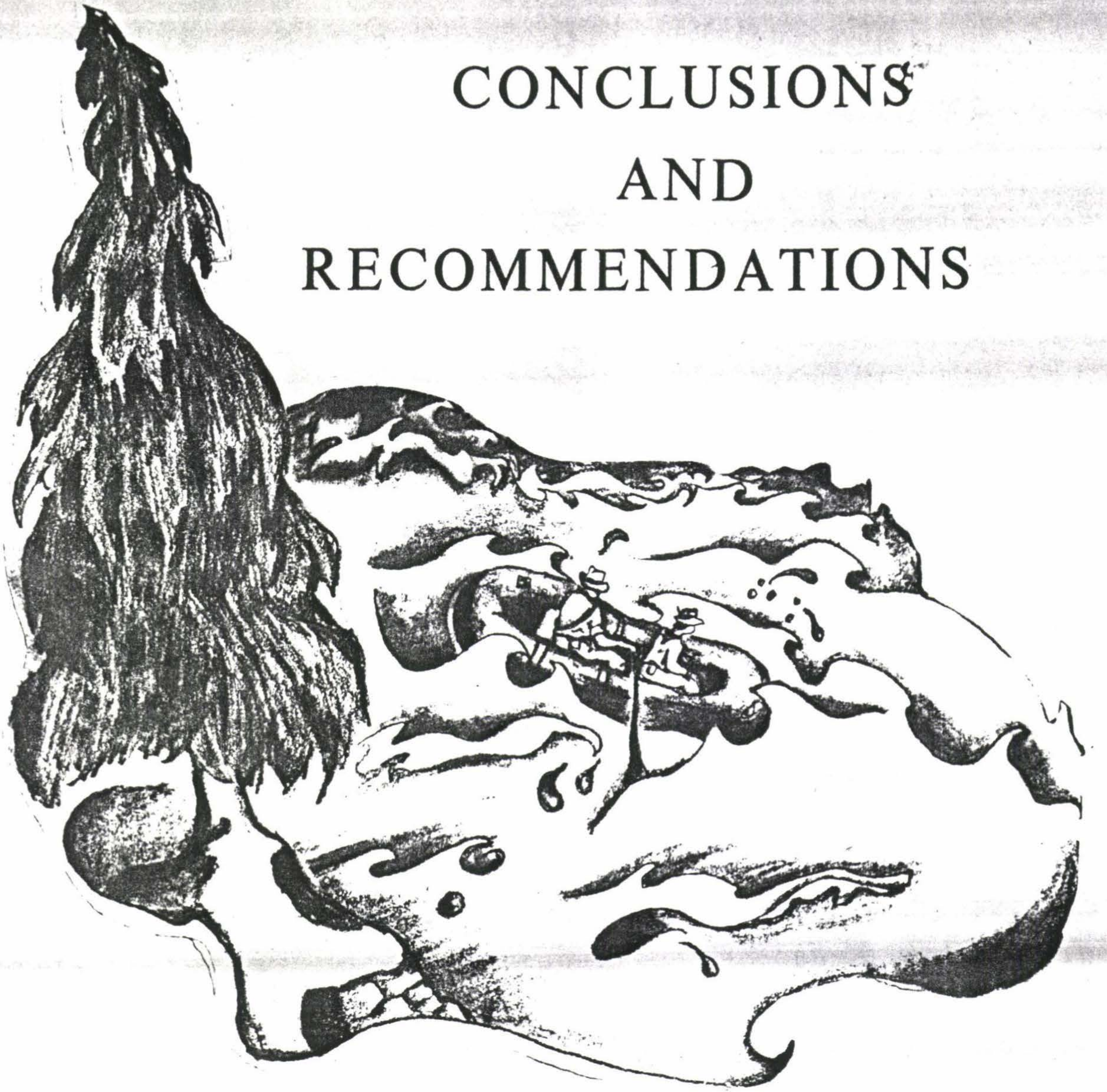
4. River Recreation Facilities: Most research literature does not address the need for management facilities. The Wild and Scenic River Study Report for the Piedra River suggests that launch and take out sites be constructed at an estimated cost of $34,000. Additional investigation since the completion of the river study indicates that these developed facilities are not required; primarily because of the amount of kayak use.

One facility that is mentioned or thought of quite often is the need for a water measuring gauge. Most boaters do not have a good idea of what level the river is flowing. At higher flows, this information is critical to the decisions of whether to launch or not. The only river flow information available at this time is from the USGS gauging station near Arboles. The unfortunate aspect of this information is that the record is taken on a month long basis and not available to the user in a timely manner to be of any use.

Data on river flow and water levels is needed by the boaters to decide on whether or not to launch. In the priority of development to assist or enhance the recreational experience, the need for a quick visual method to determine river level appears to be number one priority over any facilities or developments for launching or taking out.

Information on campsites was incorporated in each brochure reviewed. Each brochure covered camping etiquette and camping methods to protect the environment. Locations of campsites were most commonly identified on maps of those rivers with permit requirements. Displaying each potential campsite along the Piedra River is not needed because of the considerable number of suitable sites. Sites that are heavily used or having conflicts with shore users should be identified for monitoring and future planning.

CONCLUSIONS AND RECOMMENDATIONS



CHAPTER V

the Cyrus H. McCormick Experimental Forest, they concluded that unstaffed trail registers can be effective in securing information from trail users. The question is whether or not river runners, being characterized as consummate individualists, would voluntarily register.

Another approach is the use of mandatory permits. The important concept in the use of permits is that it fosters contact between the management agency and the user (Hendee, 1974). Although permits are now required on many rivers throughout the west, it does not appear that a permit system on the Piedra is needed at this time.

It is recommended that the Forest establish two field visitor registration points on the Piedra River specifically designed and located for boaters. They would have to be placed downstream in locations where boaters could see them well in advance and be able to land at any water level. Region 2 design PL-16-R2-A could be installed at approximately $500 for both.

If the registers were placed at logical resting points along the river, a study could be made similar to the study of registration by Leatherberry and Lime (1981). Volunteers could observe the boating and use of the registers.

B. Implementation of Management Prescription 10D.

This study indicates that user coefficients are needed even though the Forest Service has not developed any for recreational activities on surface waters. During January 1977, the Bureau of Outdoor Recreation published a manual on recreation carrying capacity. In the summary of the results of extensive study of nonpower boating in flowing waters, the compilers state:

V. CONCLUSIONS AND RECOMMENDATIONS

The Study of potential whitewater use on the Piedra River has resulted in a number of conclusions on how use will increase, how management should respond to implementing management prescription 10D, and what information or facilities should be provided to accommodate the recreating public. Another very important management consideration is what studies or research are needed to assist management into the future. Potential administrative study and research is identified as an opportunity in the management of the Piedra River, but should not be considered the exclusive need on this river. The recommendations of this study may possibly apply to all the smaller floatable rivers in the Rocky Mountain Region.

A. Whitewater Use: The Need for Measurement

In the previous chapter the conclusion was drawn that whitewater use would increase on the Piedra, but the amount was not established. It is further concluded that if the Forest is expected to apply proper management on the Piedra River, there is a need to measure boater use.

There are a number of methods for measuring use to provide data with the statistical reliability needed to develop well founded management decisions. The various methods range from having volunteers stationed at points along the river, actually counting the users, to highly sophisticated camera techniques for photographing use. Without enumerating all of the intermediate techniques, there are two low cost methods of gathering use data; voluntary field registration and a permit system.

Both systems have their good and bad points. Studies by Leatherberry and Lime (1981) indicate that volunteer registration of users might work on the Piedra. In their study of trail registration on

The Rocky Mountain Region should investigate the potential for research to study the uniquely different rivers of the region and develop carrying capacities and user coefficients for rivers of this character. The research emphasis should be on determining social carrying capacity as well as environmental (physical) capacities.

The opportunity and need for research in this administrative area is great. "To improve the planning and management process, administrators recognized the value of better understanding of how rivers are used, by whom, and what visitors think about the river. They should encourage the development and use of standardized data collection systems of regional or national scope to allow not only comparability among rivers, but to document changes and shifts in river recreation use as well." (Lime, 1979).

C. User Information and Controls

1. User information: The need for information on the conditions of floating the Piedra River is steadily growing. A major barrier to producing information publications is that defining the actual accomplishments of interpretation is much more difficult than identifying the costs (Wager, 1976). Although Wager wrote that particular thought several years back, he provided a lasting and valid warning to managers. "Evaluating effectiveness requires clear objectives; unless we have defined precisely what we want to do, we cannot determine how well we have done it. However, objectives for interpretation have seldom been specified in terms that permit effectiveness to be measured."

   The major interpretation objective for the Piedra is to provide users sufficient information to allow them to decide if they want to launch or not. Another objective is to clarify for the user what the Piedra River is like in terms of the environment and water form. The unfortunate matter is, if the managing agency does not dispense the proper information, users for various reasons will give out information that can be misleading. The following example relates directly to the Piedra River.

> "Responses regarding suggested optimum carrying capacities for this activity range from a low of 3½ crafts per mile to a high of 12 crafts per mile, averaging 6¼ crafts per mile (or approximately 840 feet between crafts if equally spaced."
>
> "Most of the administrators agree that the current speed and degree of difficulty; the quality of site amenities; the width of the water body, and the degree of organization all are important factors which affect the optimum carrying capacity of any given water body. Most administrators interviewed agreed with the following two assumptions for estimating daily carrying capacity: (1) a turnover rate of 24 per day (assuming a speed of 2 miles per hour); and (2) 2 people per craft."

The above state of the art estimation served a useful purpose but is not adaptable to the river situations in the Rocky Mountain Region. In the case of the Piedra, river speed exceeds two miles per hour and most river trips when made with rafts average greater than two persons per craft. Also, since the river is not suitable for canoes, all nonrafting whitewater use is in kayaks; thus only one person per craft.

Until research develops coefficients for recreational activities on rivers, managers in the Rocky Mountain Region can use those that are developed for land based recreational activities. In the case of the Piedra, the wild reach that is utilized by river runners can be managed under the ROS class of semi-primitive nonmotorized. Following this rational, scenic rivers with roads in the immediate river corridor can be managed as semi-primitive motorized; without roads, semi-primitive nonmotorized could be used. Recreational reaches can be managed under a span between semi-primitive nonmotorized to urban, depending upon the amount of development in the river corridor.

Two interim recommendations are warranted. The Rocky Mountain Region should amend Uniform Forest Management Prescriptions to include user coefficients to guide managers until research can answer specific needs of carrying capacities and water surface user coefficients. The San Juan National Forest also needs to establish use levels for water surfaces of lakes, reservoirs, and flowing rivers that are unique to the Forest situations.

such safety practices as having personal floatation devices, extra oars or paddles, first aid kits, and personal gear such as wet suits and helmets. These reminders can be made through information handouts or by posting on bulletin boards at the launch sites.

D. User and Management Facilities:

Several facilities for user convenience have already been discussed. They are registration stations and bulletin boards for posters and other safety reminders. Following is a listing of all the developments needed to promote safe and quality recreation for boaters on the Piedra River:

...Two bulletin boards, located at First Fork and near the launch point on the upper Piedra Road, for the dissemination of information and safety tips. Regional standard design R2-1-52.71 can be used at an estimated cost installed of $300 for both.

...Two registration stations for voluntary registration. These would have to be located on the river at a location easily seen and where the boater could easily pull to shore and register. Estimated cost installed $500 by using R2 design PL-16-R2-A.

...Two measuring devices to provide users with a quick visual identification of water level. The type used will have to be developed to provide a correlation between the measuring gauge at Arboles and the location of the device. It is recommended that one be placed at the bridge on the upper Piedra and the other be at the Colorado Highway #160 bridge. Depending on the type of device chosen in the final analysis, the cost could approximate $1000 to $3000. A sizeable administrative cost will be involved in establishing the correlation of the data unless the task can be incorporated into a volunteer program.

During the Piedra wild and scenic river study several boat trips were made to map, describe and photograph the rapids and put together an informal guide for the river runner. However, because of other demands on administrative time and budget (Forest Planning Effort) the information was never dispensed to the public.

In 1981, an article was written in AMERICAN WHITEWATER, the journal of the American Whitewater Affiliation, describing a trip on the Piedra. Aside from some questionable descriptions of rapids, the author seemed to convey the message to get into your boats and get floating. The author gave the impression that there was nothing more demanding than scouting on a few of the rapids. It is expected that his concluding paragraph will encourage many users. He wrote:

> "Even with the Box Canyon hazards, the Piedra is the best all around whitewater stream of the San Juan Mountains. 14 [sic] miles of roadless boatable river canyon in a forest environment is found nowhere in Colorado. Anyone planning a whitewater safari in Colorado should include a run on the Piedra."

The San Juan National Forest needs to put the Piedra River information into a usable format and publish a boater's guide. The guide should include a map of the river with the rapids located and described. It should also include descriptions on safe boating, the physical environment, and any other information that will add to the rewards of the river recreational experience.

2. User Safety: The review of river plans and other agency documents indicate that it is possible to encourage safe use without destroying the individual's freedom of choice in risk sports. It is suggested that river managers approach to user safety be the same as the approach to other dispersed recreational activities in general. To encourage safe use, the San Juan National Forest needs to promote boater safety by reminding the user of

4. Develop and publish a brochure to provide information to whitewater boaters.

5. Post safety reminders at the launch points. Also, include safety messages in the brochure recommended above. Bulletin boards would have to be installed.

6. Construct two measuring devices to provide easy visual information on how high the river is flowing.

7. Improve the areas for launch and take out.

8. Inventory the condition of all dispersed camping sites in the river corridor, using Frissell's method.

The implementation of recommendations one, two and five through eight are within the scope and authority of the Forest Supervisor and/or the District Rangers. An amended management prescription can be developed at the Forest level. To be included in the Forest Land and Resource Management Plans, the amended prescription would have to be accepted by the Regional Forester. Developing and printing of an information brochure would need to follow the procedures and approvals of the Government Printing Office.

...A launch site for rafts can be easily developed at the Piedra picnic ground. All that needs to be accomplished is to construct a short spur from the existing parking lot down to the river's edge. Some clearing is needed at the take out point at the lower Piedra Campground. Presently there is vehicle access nearly to the water's edge however, the willows need to be cleared from the shoreline. Total estimated cost of this work is less than a five hundred dollars.

...An inventory of camping sites and their condition along the river is needed. The inventory can be conducted under the Frissell method of measuring user impact. This inventory needs to be accomplished regardless of whether the users are river runners or land based recreationists. This inventory will also be useful for managing the river corridor for its wilderness resource.

E. Summary of Recommendations

1. Install two field registration devices to collect user data through voluntary boater registration. The Trail Register Desk, PL-16-R2-A is suggested.

2. Implement a volunteer study of the effectiveness of the voluntary registration system.

3. Amend Uniform Forest Management Prescription 10D to include ROS use coefficients. Wild river segments should be managed for semi-primitive nonmotorized ROS class when not in wilderness. If in wilderness, the 08 series prescriptions should be used. Scenic river segments should be managed for semi-primitive nonmotorized or motorized ROS opportunity depending on if roads in the river corridor are present. Recreational segments could be managed for ROS opportunity ranging from semi-primitive nonmotorized to roaded natural depending on the amount of development in the river corridor.

LITERATURE
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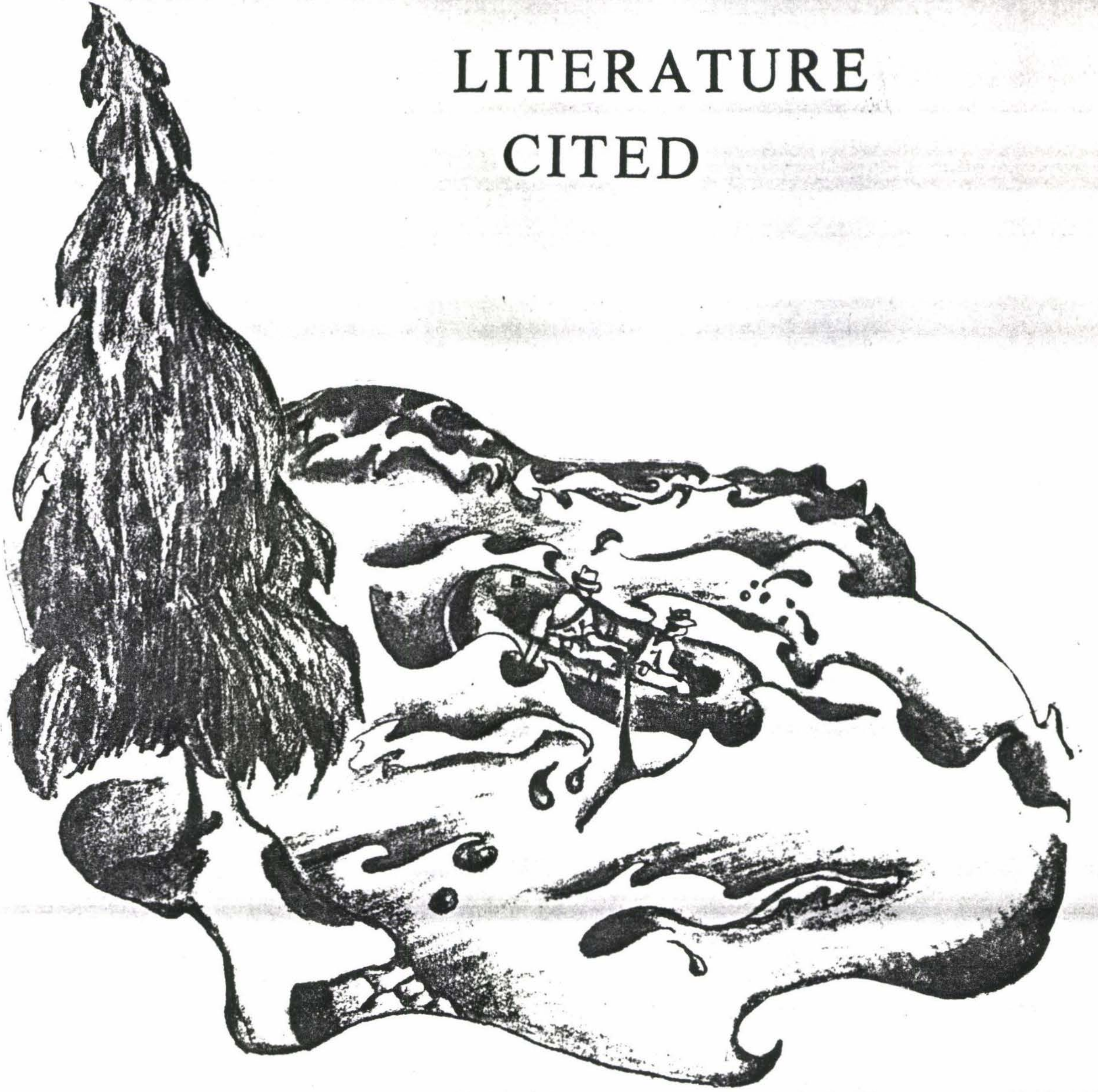

CHAPTER VI

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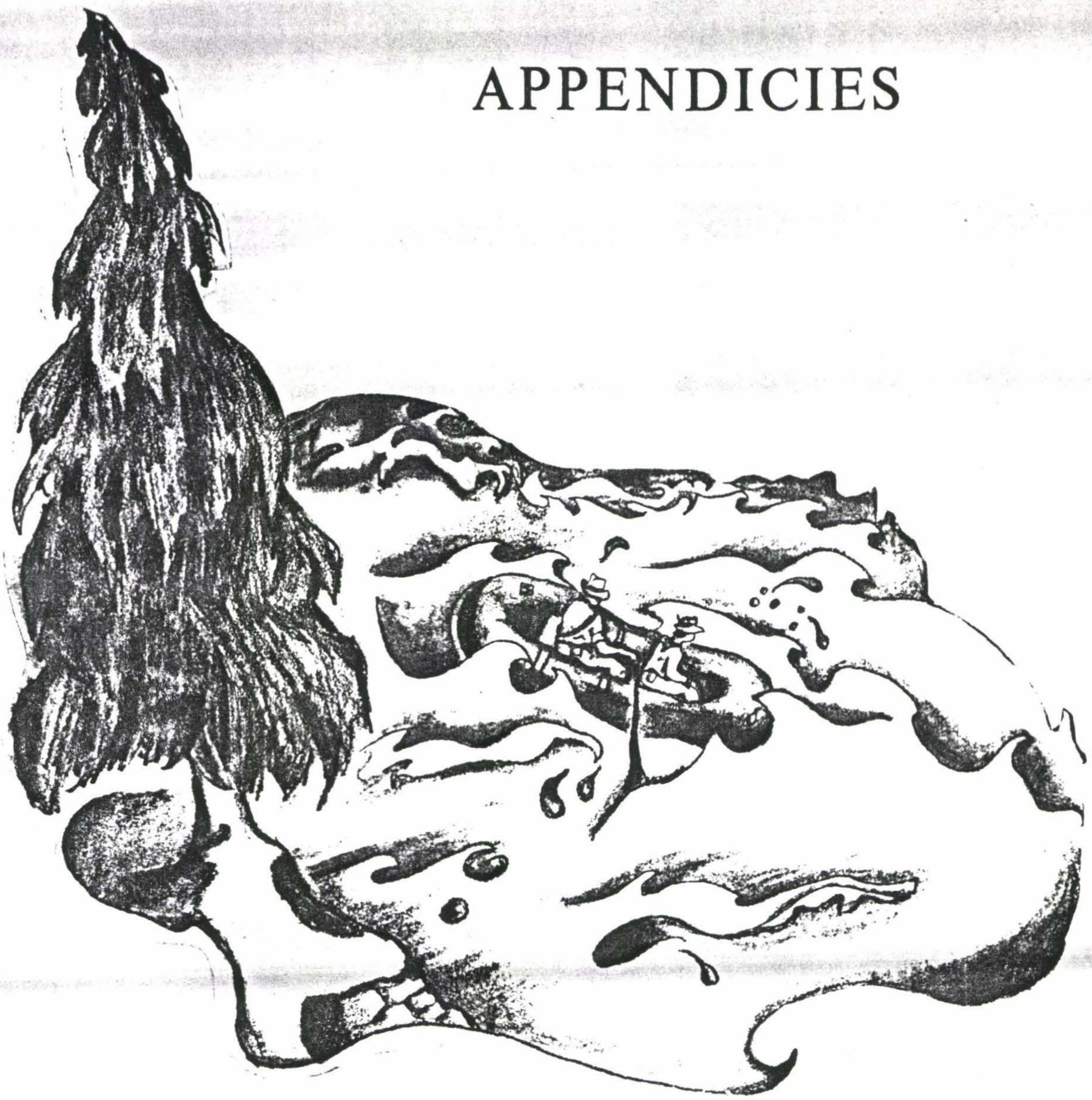
APPENDICIES



PRESCRIPTION FOR MANAGEMENT AREA 10D

(Provides for Wild and Scenic Rivers.)

MANAGEMENT PRESCRIPTION SUMMARY

General Description and Goals:

Management emphasis is on river segments designated as a component of the National Wild and Scenic River System and those recommended for designation. "Wild Rivers" are managed to be free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and water unpolluted. "Scenic Rivers" are managed to be free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible in places by roads. "Recreational Rivers" are managed to be readily accessible by road or railroad, and to maintain developments that may have occurred along the shoreline and impoundments or diversions that may have occurred in the past.

B. MANAGEMENT REQUIREMENTS

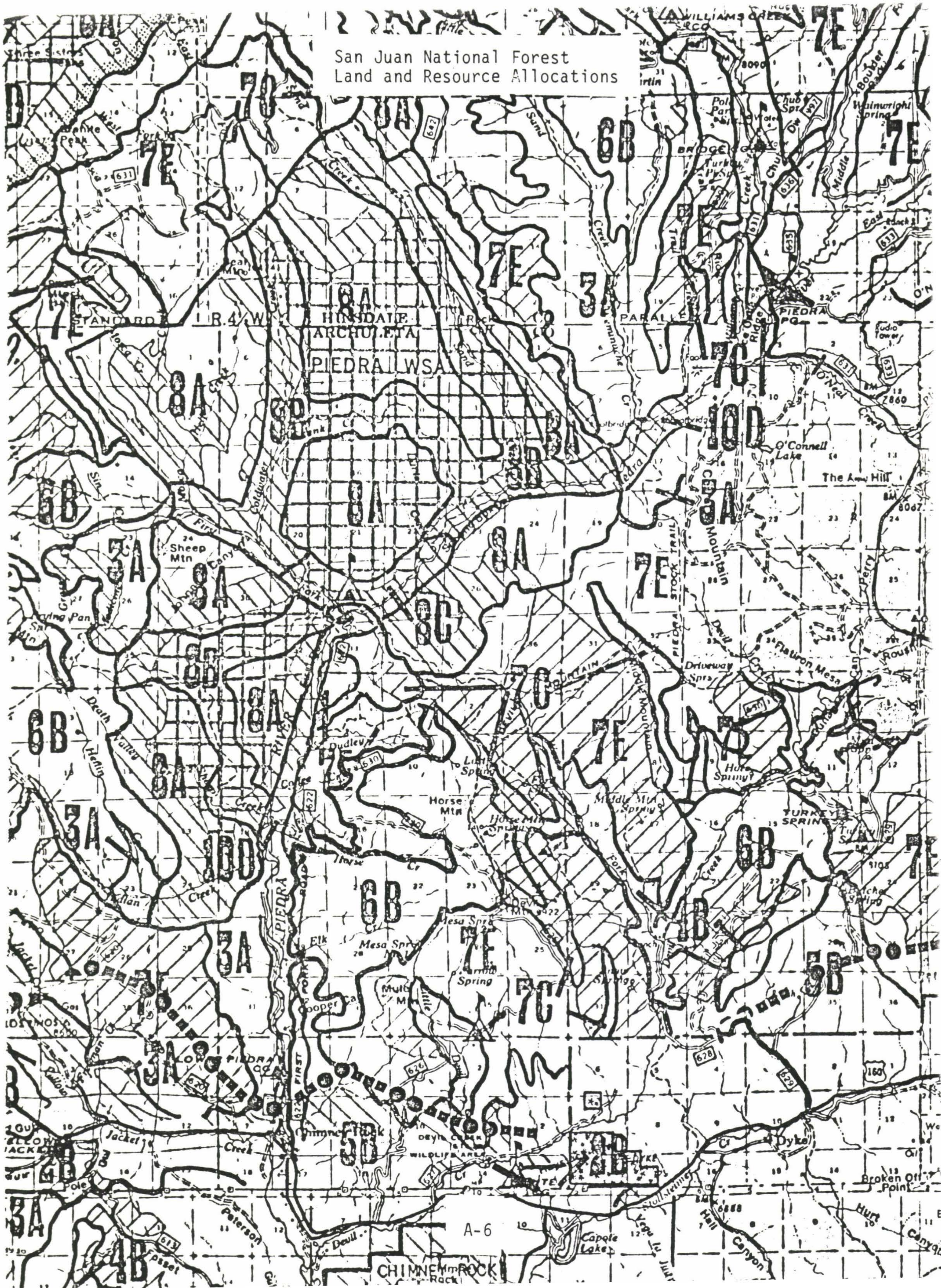
MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Diversity on National Forests and National Grasslands (A00)	01 Manage for natural succession in wild and scenic segments. Provide diversity in recreational river segments through harvest treatments specified under management activity "Silvicultural Prescriptions." (1037SJ) (10D)	
Cultural Resource Management (A02)	01 Allow low-intensity development of cultural resource properties as compatible with river designation; for example, interpretive and protective signing and stabilization of historic structures. Encourage non-recreation use (research, etc.) to the extent that such use enhances the recreation experience or does not present unsolvable conflicts with designation purposes. (0555SJ) (10D)	
Visual Resource Management (A04)	01 Meet stated visual quality objective. (0125) (10D)	a. Do not exceed an Adopted Visual Quality Objective (VQO) of: - Retention on wild and scenic segments - Partial retention on recreational segments. (6431SJ) (10D)
Dispersed Recreation Management (A14 and 15)	01 Provide the following recreation opportunities in the respective river segments: - Wild river segments: Semi-primitive non-motorized recreation in an unmodified setting. - Scenic river segments: Semi-primitive motorized recreation in an essentially unmodified setting. - Recreational river segments: Roaded natural recreation in a generally unmodified setting. (0556SJ) (10D)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Recreation Site Construction and Rehabilitation (A05 AND 06)	01 Provide facilities to meet the overall objective of the various segments. a) Wild river segments: Provide rustic or rudimentary facilities when needed to protect existing camping sites; otherwise, allow no new campgrounds, picnic areas, and trailheads in river corridors. b) Scenic river segments: Provide rustic or rudimentary facilities at existing camping sites, or develop new sites when needed for protection of the site rather than for the comfort of the user. Such sites must be screened from view. Sites may also be provided for boaters on boatable segments which are otherwise inaccessible by trail. c) Recreational river segments: Provide contemporary/rustic facilities at new sites such as campgrounds, picnic areas, trailheads, parking and boat launching areas for the comfort of users as well as for site protection. Such sites may also be provided for boaters on boatable segments which are otherwise inaccessible by trail. (0557SJ) (10D)	
Wildlife Habitat Improvement and Maintenance (C02, 04, 05 and 06)	01 Permit investments in wildlife habitat projects that do not cause adverse impact to the scenic qualities of the river corridor. (1545SJ) (10D)	
Range Resource Management (D02)	01 Allow domestic livestock to graze within corridors, but decrease grazing where adverse impacts on river banks and vegetation occur. Exclude cattle from sensitive sites and reduce numbers or period of use in areas where grazing degradation has occured. (2046SJ) (10D) 02 Prohibit trailing (driving) of livestock within the iver corridor except for established stock driveways. (2047SJ) (10D)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Range Improvement and Maintenance (D03, 04, 05 and 06)	01 Limit investments of range cultural practices to broadcast seeding of native forage species and noxious weed control. (2048SJ) (10D)	
	02 Limit investments in structural improvements to those needed for proper distribution and river area protection. Control bank trampling. (2049SJ) (10D)	
Silvicultural Prescriptions (E03, 06 & 07)	01 Timber will be available on a low yield basis, although sustained non-declining timber yield is not planned. Harvest timber only to maintain healthy stands and to enhance visual, wildlife, and other values of the corridor. (2545SJ) (10D)	
	02 Manage forest cover types using the following harvest methods: - Clearcut in aspen. - Selection in conifer cover types. (2546SJ) (10D)	a. Silvicultural Standards: 1) Aspen: Patch clearcut in units o one to three acres. 2) Conifer cover types: Remove no more than 30 percent of the basal area in any one cutting period (30) years with selection harvest methods. (8061SJ) (10D)
Rights-of-way and Land Adjustments (J02, 13, 15, 16, 17, and 18)	01 Do not dispose of National Forest lands within corridor. All private land within the established river corridor boundary is subject to the scenic easement or acquisition program. (4241SJ) (10D)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Transportation System Management (LO1 & 20)	01 Manage motorized vehicle use on the respective segments as follows: - Wild river segments: Prohibit motorized vehicle use (including snowmobiles) off Forest System roads and trails. Close existing trails to motorized vehicle use. - Scenic and Recreational river segments: Prohibit motorized travel off development roads and trails except for oversnow vehicle use. (4779SJ) (10D)	
Fire Planning and Suppression (PO1)	01 Provide a level of protection from wildfire that is cost efficient and that will meet management objectives. (5032SJ) (10D)	a. Wildfire protection levels: 1) Inland ponderosa pine; pinon pine-juniper; Gambel oak; aspen; grasslands: a) Confine or contain wildfires burning at Fire Intensity Levels (FIL's) I and II. b) Promptly control wildfires burning at FIL's III and higher. 2) Mixed browse; mixed conifers; Engelmann spruce-supalpine fir: a) Promptly control wildfires burning at all FIL's. (9636SJ) (10D) b. Do not allow tractor use for fire suppression within river corridors. (9637SJ) (10D)

San Juan National Forest
Land and Resource Allocations


7D
8A
7E
6B
3A
7C
10D
8C
8B
5B
2B
3A
4B
7E
PIEDRA WSA
HINSDALE
ARCHULETA
STANDARD
R.4 W.
PARALLEL
Sheep Mtn
First Fork
Coldwater
PIEDRA RIVER
FIRST FORK ROAD
Dudley
Horse Mtn
Horse Cr
Mesa Spring
Elk
Cooper
Mule Mtn
Devil Mtn
O'Connell Lake
The Amy Hill
PIEDRA STOCK TRAIL
Driveway Spring
Flatiron Mesa
Hurt Spring
TURKEY SPRING
Middle Mtn
Death Valley
Heflin
Jackson
Chimney Rock
DEVIL CREEK WILDLIFE AREA
Capote Lake
Dyke
Broken Off Point
Hurt Canyon
Hall Canyon
Peterson
Beull
CHIMNEY ROCK
WILLIAMS CREEK
BRIDGE
PIEDRA
Wainwright Spring
Weminuche
Sand Creek
160
631
630
622
626
628
629
633
613
620

APPENDIX B

RIVER CHARACTER DESCRIPTORS
INTERAGENCY WHITEWATER COMMITTEE

ARIZONA-NEVADA-NEW MEXICO-TEXAS-UTAH

RIVER NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
RIVER NAME GENERAL	Bill Williams River	Carson, East Fork	Colorado-Cataract NPS	Colorado-Fisher Towers 1975	Colorado-Grand Canyon NPS	Colorado-Blyth/Imperial	Colorado-Laguna Dam	Colorado-Westwater 1975	Dolores-Gateway to Colorado River	Gila-Arizona	Gila-Lower BLM	Gila-Middle	Gila-Upper	Green Cataract NPS	Green-Flaming Gorge	Green Desolation Gray	Green Labyrinth Canyon	Owyhee-South Fork 1975	Rio Grande-Lobatos to John Dunn Instant	Rio Grande-John Dunn to Taos Jct. Instant	Rio Grande-Santa Elena Canyon 1968	Rio Grande Mariscal Canyon 1968	Rio Grande-Boquillas Canyon 1968	Rio Grande-L. Canyon 1968	Salt Above Indian Reservation Boundary	Salt Below Indian Reservation Boundary	San Francisco Arizona	San Francisco New Mexico	San Juan Montezuma to Clay Hills	Verde, Upper
Period Runnable																														
Spring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Summer	x	x	x	x	x	x	x	x	x					x	x	x	x		x	x	x	x	x	x					x	
Fall	x		x	x	x	x	x	x						x	x	x	x				x	x	x	x						
Winter	x				x	x	x			x					x						x	x	x	x			x	x		
Difficulty																														
I-II		x		x	x	x	x			x	x		x	x	x		x	x				x	x			x	x	x	x	x
III-IV 3		x	x		x			x	x			x				x			x	x	x			x	x					x
V+					x														x						x					
Hazardous High Flows			x	x				x	x	x		x	x					x	x	x	x	x	x	x	x	x	x	x	x	x
Limiting Low Flows 4	x	x			x				x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Controlled Flow	x				x	x	x							x	x	x					x	x	x	x					x	
Trip Length—Days 2	1-2	1-3	3-7	1	1-2	1-5	1-3	1-3	1-3	1	1-2	1-2	3-5	3-7	1-2	3-6	4	1-4	3-4	1	1-2	1-2	1-2	6-10	1-4	1	1	2-4	1-8	1-5
Access to Launch—Road		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Access to Launch—Air	x	x		x									x		x	x												x		
Shuttle Service			x	x				x						x	x						x	x	x	x					x	
Visible Paralleling Roads				x		x	x		x																					
Visible Paralleling Trails							x								x				x											
Maps Available	x		x	x	x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x			x	x
Interpretive Information	-		x	x	x	x		x						x	x	x	x				x	x	x						x	
Fishing		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hunting	x					x		x	x						x	x	x											x	x	
Hiking Trails			x		x	x					x	x	x	x	x		x		x	x		x							x	
Swimming		x		x	x	x	x	x	x	x	x		x			x										x	x	x	x	x
Hot Springs		x								x	x		x							x	x	x	x	x				x		x
Designation																														
Wild																			x	x		x	x	x						
Scenic																						x	x	x						
Recreation																														
Wilderness													x																	
National Park			x		x									x							x	x	x							
National Recreation Area															x														x	
Other												x					x								x	x			x	x
COMMERCIAL																														
Power Boat—Upstream																														
Float Boat—Motor			x	x	x			x	x					x		x	x												x	
Float Boat—Non-motor 1		x	x	x	x			x	x					x	x	x	x	x	x	x	x	x	x	x					x	
Small Craft—Kayak, etc.		x	x	x	x	x		x	x				x	x	x	x	x	x	x	x	x	x	x	x					x	
Number of Outfitters		12	18	22	22	2		20	19					18	7	28		4	4	12	17	17	17	17					11	
NON-COMMERCIAL																														
Permits Required			x		x			x	x					x		x			x	x	x	x	x	x	x			x	x	
Reservations Required			x		x			x						x		x													x	
Restrictions on Type of Craft			x		x									x		x			x		x	x	x	x						
Motors Prohibited																		x	x	x					x	x				
Campsite Assigned								x																						
Portages Required												x							x						x					x

Eliminate?
Eliminate

CALIFORNIA

RIVER NUMBER	1	2	3	4	5	6	7	8			11	12	13	14	15	16	17	18	19	20	21
RIVER NAME GENERAL	Smith	Klamath	Mad	Trinity Lower	Trinity Main Stem, Helena to Burnt Ranch	Trinity Lewiston to Helena	Sacramento Upper	Sacramento Lower	Feather Mid Fk. Sloat to Nelson Cr. Instead	Feather Mid Fk. Beckwourth to Sloat Instead	Carson East Fork	American South Fork 1975	Mokelumne	Stanislaus	Merced	Toulumne 1975	Kings	Kern Upper	Kern Lower	Eel Middle Fork	Lower Stanislaus
Period Runnable																					
Spring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Summer		x		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x
Fall		x			x	x		x	x	x				x		x					x
Winter	x				x	x		x													x
Difficulty																					
I-II	x	x	x	x	x	x		x		x	x		x						x		x
III-IV 3	x	x		x	x	x	x		x		x	x		x	x	x	x	x	x	x	x
V+																		x			
Hazardous High Flows	x	x	x	x	x		x								x	x	x	x	x	x	x
Limiting Low Flows 4	x		x		x		x		x	x	x				x	x	x	x	x	x	x
Controlled Flow					x	x		x	x	x		x	x	x		x			x		x
Trip Length—Days 2	1-3	1-3	1-3	1-3	1-2	2-3	2	3-5	1	2	1-3	1-2	1	1-2	1-2	2	1/2	1-3	2-3		1
Access to Launch—Road	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Access to Launch—Air								x													
Shuttle Service																					
Visible Paralleling Roads	x	x	x	x	x	x	x	x	x	x			x		x		x	x	x	x	x
Visible Paralleling Trails								x										x	x		
Maps Available					x	x	x	x	x	x	x	x		x	x	x	x				
Interpretive Information	x	x	x	x	x	x						x		x							
Fishing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hunting	x	x		x	x	x		x	x	x	x						x			x	
Hiking Trails									x	x					x		x	x	x		x
Swimming	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
Hot Springs											x								x		
Designation																					
Wild						*x														*x	
Scenic						*x			x											*x	
Recreation		x								x											x
Wilderness																		x			
National Park																					
National Recreation Area																					
Other					x											x					
*State of California COMMERCIAL																					
Power Boat—Upstream																					
Float Boat—Motor		x																			
Float Boat—Non motor 1		x			x		x				x	x		x	x	x	x	x	x	x	x
Small Craft—Kayak, etc.		x			x						x		x			x	x				x
Number of Outfitters	1	25			4		1				15	12		17	11	1	3	2	3	3	1
NON-COMMERCIAL																					
Permits Required																x	x				
Reservations Required																					
Restrictions on Type of Craft									x												
Motors Prohibited									x			x	x	x	x		x	**x			
Campsite Assigned																	x				
Portages Required								x	x						x			x	x		

**Motors prohibited in the Wilderness portion

COLORADO-MONTANA-WYOMING

RIVER NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
				1975					1975	1975		1975	1968	1968	1968	1968	1968	1968	1975	1975	1968			1975			1975	1975	1975	1975	1975
													FLATHEAD																		
RIVER NAME GENERAL		Animas	Arkansas	Cache le Poudre	Colorado Glenwood Canyon	Colorado Pumphouse to State Bridge	Colorado State Bridge to Dotsero	Colorado Lomato Westwater	Dolores Cahone to Slick Rock	Dolores Slick Rock to Bed Rock	Dolores Gateway to Utah line	Dolores USFS	N. Fork Scenic	N. Fork Rec.	S. Fork Wild	S. Fork Rec.	Middle Fork Wild	Middle Fork Rec	Green River Dinosaur	Gunnison	Missouri, Upper	N. Platte USFS	N. Platte BLM	Piedra	Rio Grande	Shoshone, North Fork	Snake Flagg Canyon	Snake Jackson Dam to Moose	Snake Grand Canyon	Yellowstone Clark Fork	Yampa Dinosaur
Period Runnable															?																
Spring		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x		x
Summer		x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	
Fall					x		x	x					x	x		x		x	x	x	x							x	x		
Winter																															
Difficulty																															
I-II		x	x	x	x	x	x	x	x	x	x		x			x				x	x		x		x			x			
III-IV	3			x	x				x			x		x	x			x	x			x		x		x	x		x		x
V+		x		x													x													x	
Hazardous High Flows		x	x	x	x				x			x			x		x					x		x		x	x	x	x	x	x
Limiting Low Flows	4	x	x				x	x	x	x	x	x			x		x			x	x	x	x	x	x	x	x	x			x
Controlled Flow						x	x	x											x	x								x	x		
Trip Length-Days	2	1	1	1	1	1 3	1 3	1 3	2 3	2 3	1 3	1 5	1 3	1	1 5	1	1 3	1 3	3 4	1	2 7	1 3	1 3	2 3	1	1	1	1	1	1	1 5
Access to Launch—Road		x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x		x
Access to Launch—Air																	x				x										
Shuttle Service		x	x		x							x									x				x	x					
Visible Paralleling Roads		x	x	x	x	x	x	x	x	x	x	x		x		x		x		x	x				x	x	x	x	x		
Visible Paralleling Trails		x										x								x			x	x			x				
Maps Available		x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x			x	x	x		x
Interpretive Information																												x			
Fishing		x	x	x	x	x	x	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hunting			x	x		x	x	x	x	x	x		x	x	x	x				x	x		x	x		x			x	x	
Hiking Trails		x				x						x			x		x		x	x		x	x	x			x				
Swimming			x					x	x	x	x									x	x		x						x		
Hot Springs					x																		x						x		
Designation																															
Wild															x		x				x										
Scenic					x								x								x										
Recreation														x		x		x		x	x		x								
Wilderness															x		x														
National Park																			x								x	x			x
National Recreation Area																				x											
Other				x		x			x	x	x											x		x							
COMMERCIAL																															
Power Boat—Upstream								x															x								
Float Boat—Motor								x			x										x		x								
Float Boat-Non motor	1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x		x	x	x		x
Small Craft—Kayak, etc.		x	x	x		x	x	x	x	x	x	x						x	x		x	x	x	x			x	x	x		x
Number of Outfitters		2	30	2	20	50	20	20	25	25	10	15	3	3	5	1	3	6	11		8	21			1		1	15	9		11
NON COMMERCIAL																															
Permits Required				x															x		x						x	x			x
Reservations Required																			x												x
Restrictions on Type of Craft				x															x										x		x
Motors Prohibited													x		x	x	x	x	x								x	x	x		x
Campsite Assigned																			x												
Portages Required				x											x		x							x							
										Eliminate?	Eliminate								Eliminate												Eliminate

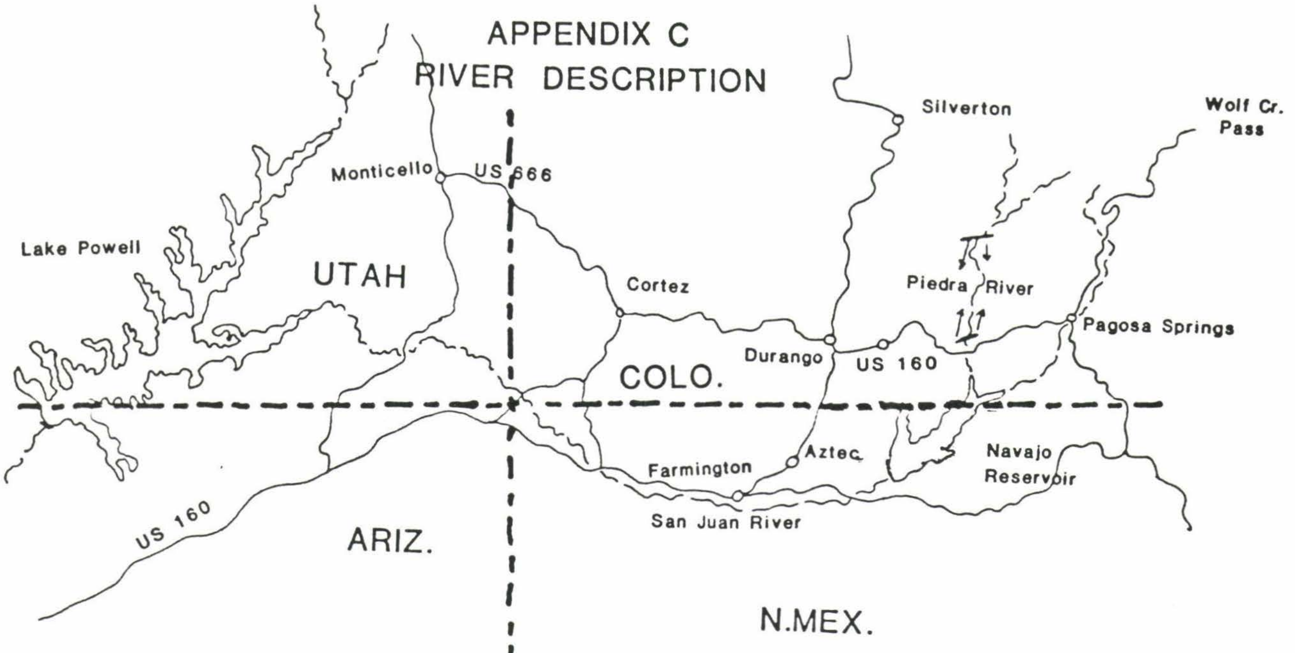
IDAHO

RIVER NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
RIVER NAME	Boise, North Fork	Bruneau 1968	Clearwater Middle Fork Instant	Coeur d'Alene, Upper	Coeur d'Alene, Lower	Jarbidge	Lochsa Instant	Moyie 1969	Owyhee	Owyhee, South Fork 1975	Payette Middle Fork Horseshoe Bend	Payette, South Fork	Payette, Cabarton Bridge Smiths Ferry	Priest 1968	Rapid	Salmon East Fork of the South Fork 1968	Salmon Lower USFS BLM 1968	Salmon, Lower 1968	Salmon Main 1968	Salmon Main North Fork to Corn Cr 1968	Salmon Middle Fork Instant	Salmon South Fork	Salmon Upper Main USFS	Salmon, Upper Main BLM	Selway Instant	Selway Lower Instant	Snake River Birds of Prey BLM	Snake River, Bliss	Snake American Falls Dam	Snake Hells Canyon	Snake South Fork	St Joe 1968
GENERAL																																
Period Runnable										SEE NEVADA (#17)																				SEE OREGON WASHINGTON (#25)		
Spring	x	x	x		x	x	x		x		x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Summer	x		x	x	x		x	x			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Fall	x		x		x						x						x	x	x	x	x		x	x			x	x	x		x	
Winter																																
Difficulty																																
I-II	x		x	x	x			x	x		x	x	x	x			x	x		x	x		x	x	x	x	x	x	x		x	x
III-IV $\boxed{3}$	x	x				x	x	x				x		x		x	x	x	x	x	x	x	x		x							x
V							x					x										x										
Hazardous High Flows	x	x		x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x		x	x						x
Limiting Low Flows $\boxed{4}$	x	x		x		x		x	x		x		x	x	x	x						x		x	x	x						x
Controlled Flow											x		x	x													x	x	x		x	
Trip Length-Days $\boxed{2}$	1-2	3-6	1-2	1-2	1-3	1-3	1-3	1-2	3-6		1-2	1-2	1	1-2		1	1-5	1-5	4-7	1-3	1-10	1-3	1	1	3-5	1-2	1-2	1	1		1-2	1
Access to Launch-Road	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Access to Launch-Air						x						x				x					x	x			x							
Shuttle Service		x				x													x	x	x				x							
Visible Paralleling Roads			x	x	x		x	x			x	x	x	x		x	x	x		x		x	x	x		x	x	x	x		x	x
Visible Paralleling Trails																			x		x	x		x	x							
Maps Available		x	x	x	x	x	x		x		x		x	x		x	x	x	x	x	x	x			x	x	x					x
Interpretive Information			x	x			x												x		x				x		x					x
Fishing	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Hunting			x	x			x	x						x	x	x	x	x	x	x	x	x			x		x	x	x		x	x
Hiking Trails	x						x								x	x			x		x	x			x	x					x	x
Swimming	x		x	x			x				x	x		x		x	x	x	x	x	x	x		x		x	x				x	x
Hot Springs		x					x		x			x							x		x		x									
Designation																																
Wild															x						x				x							
Scenic																					x				x							
Recreation			x				x																			x						x
Wilderness																					x				x							
National Park																																
National Recreation Area															x								x									
Other																	x	x	x	x						x						
COMMERCIAL																																
Power Boat-Upstream					x												x	x	x								x					
Float Boat-Motor					x												x	x	x					x			x					
Float Boat-Non motor $\boxed{1}$		x		x	x	x	x	x	x		x	x	x	x			x	x	x	x	x		x	x	x		x					x
Small Craft-Kayak, etc.				x	x			x				x		x			x	x	x	x	x		x									x
Number of Outfitters		4				4	1		6		3	3	1				49	49	30	12	28		6	3	4		5	1				2
NON COMMERCIAL																																
Permits Required																			x		x				x							
Reservations Required																			x		x				x							
Restrictions on Type of Craft																																
Motors Prohibited		x				x			x												x		x		x							
Campsite Assigned																					x											
Portages Required		x				x		x	x				x																			

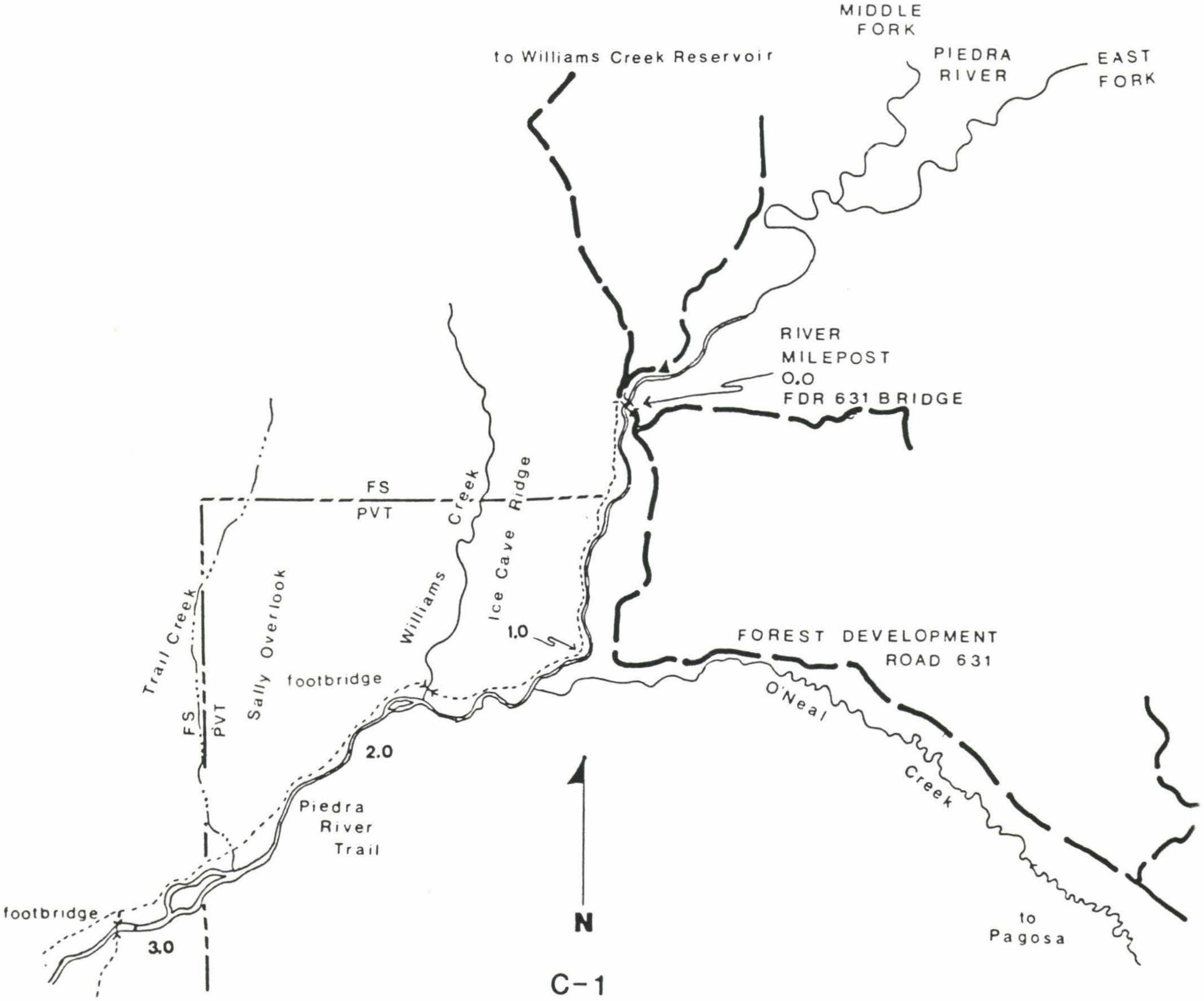
OREGON-WASHINGTON

RIVER NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
							1968	1975								Instant	Instant	1968	1968	1968	1968	1968				1968				
RIVER NAME GENERAL	Chewack	Chiwawa	Clackamas	Deschutes	Grand Ronde	Humptulips	Illinois	John Day Lower 140 mi	Lewis, Upper	McKenzie	Nooksack	Owyhee, Lower	Owyhee, Upper	Queets	Quinault	Rogue Recreation/Scenic	Rogue Wild	Sauk Bedal/Whitechuck	Sauk Whitechuck Clear Cr	Sauk Below Clear Creek	Skagit USFS	Skagit NPS	Skykomish	Snake Hell's Canyon	Snoqualmie M F	Suiattle	Tieton	Umpqua North	Wenatchee	Wynoochee
Period Runnable																														
Spring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Summer		x	x	x	x	x			x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Fall			x	x	x					x						x	x				x	x		x			x			
Winter			x	x				x		x	x					x	x				x	x		x	x					
Difficulty																														
I-II	x	x	x			x			x	x				x	x	x				x	x	x			x				x	x
III-IV $\boxed{3}$		x	x	x	x		x	x	x		x	x					x	x				x	x	x	x	x	x	x		x
V+							x						x						x									x		
Hazardous High Flows		x	x			x	x	x	x		x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Limiting Low Flows $\boxed{4}$	x	x	x		x	?	x	x	x	x	x	x	x	x	x			x	x	x			x		x	x		x	x	x
Controlled Flow			x	x												x	x					x		x						
Trip Length—Days $\boxed{2}$	1	1	1	1 3	1 4	1	3 5	1 5	1	1	1/2	3 5	3 5	1/2	1/2	1 4	3 5	1 2	1 2	1 2	3	1	1	1 5	1	1	1	1	1	1
Access to Launch—Road		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Access to Launch—Air					x					x		x																		
Shuttle Service				x	x					x		x	x			x	x							x						
Visible Paralleling Roads	x	x	x	x						x	x			x	x	x		x	x	x	x	x	x		x	x	x	x		x
Visible Paralleling Trails			x	x						x		x	x				x							x			x	x		
Maps Available		x	x	x	x		x	x		x		x	x	x	x	x	x					x		x	x		x		x	
Interpretive Information			x	x								x	x			x	x					x		x		x				
Fishing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hunting		x		x	x			x		x		x	x			x	x	x	x	x		x	x	x	x		x			
Hiking Trails			x	x		x			x	x	x					x	x							x				x	x	x
Swimming			x		x		x	x								x	x						x	x						
Hot Springs			x									x	x																	
Designation																														
Wild																	x							x		x				
Scenic														x	x	x		x	x	x				x			x			
Recreation			x	x						x						x					x						x			
Wilderness							x																							
National Park														x	x															
National Recreation Area																						x		x						
Other					x																		x							
COMMERCIAL																														
Power Boat—Upstream				x				x		x						x								x						
Float Boat—Motor					x			x		x						x								x						
Float Boat—Non-motor $\boxed{1}$			x	x	x		x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x		
Small Craft—Kayak, etc.			x	x			x	x		x		x	x	x	x	x	x				x		x	x			x	x		
Number of Outfitters				65	12		3	10		3		38	38	4	4		42	3	3	3	3	5		30		3		13	1	
NON-COMMERCIAL																														
Permits Required							x			x							x					x		x						
Reservations Required																	x							x						
Restrictions on Type of Craft														x	x															
Motors Prohibited							x							x	x		x											x		
Campsites Assigned																														
Portages Required				x			x				x		x		x		x						x			x				

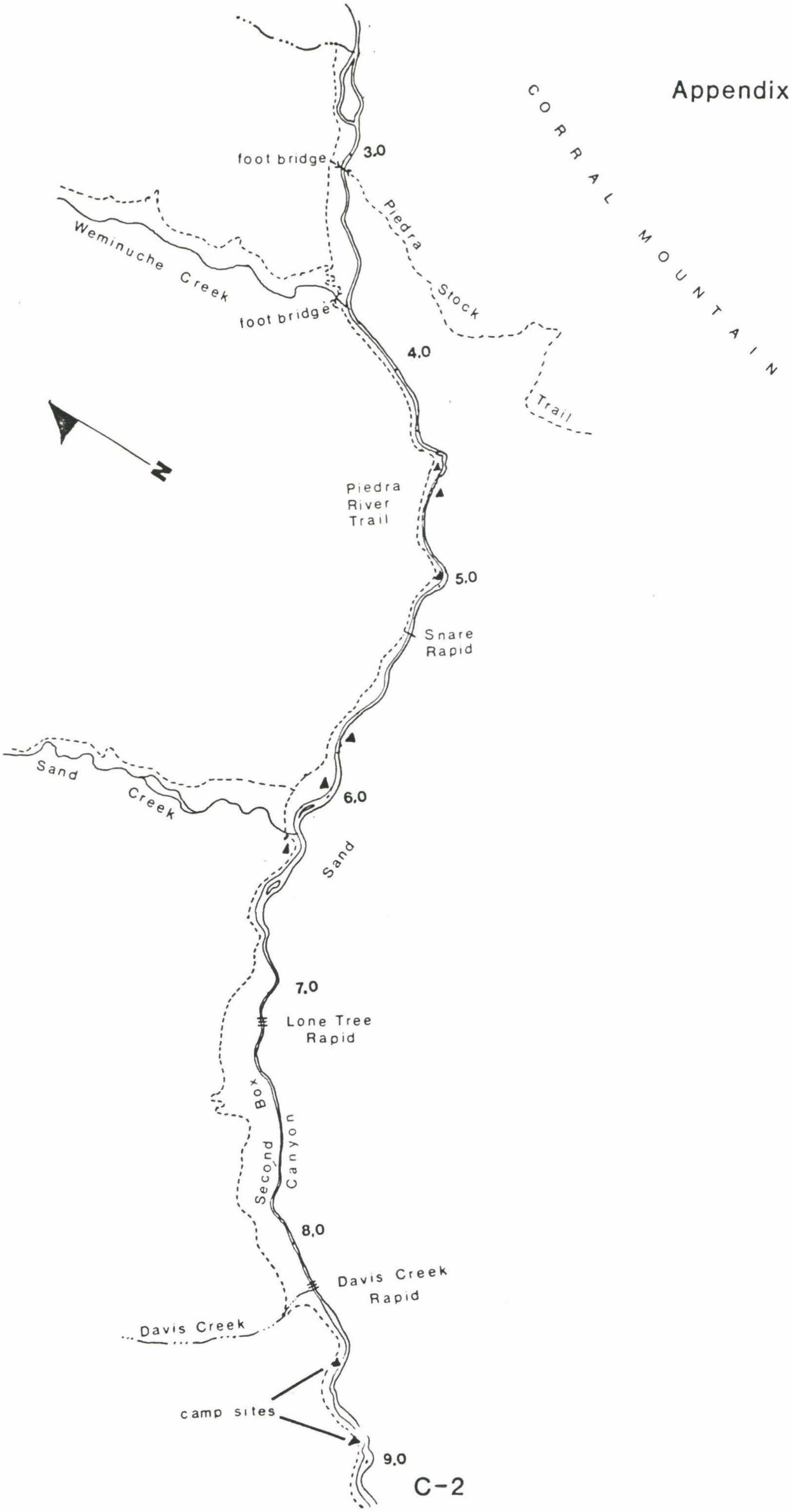
APPENDIX C
RIVER DESCRIPTION


Lake Powell
UTAH
Monticello
US 666
Cortez
Silverton
Wolf Cr. Pass
Piedra River
Pagosa Springs
Durango
US 160
COLO.
Aztec
Farmington
Navajo Reservoir
San Juan River
US 160
ARIZ.
N.MEX.

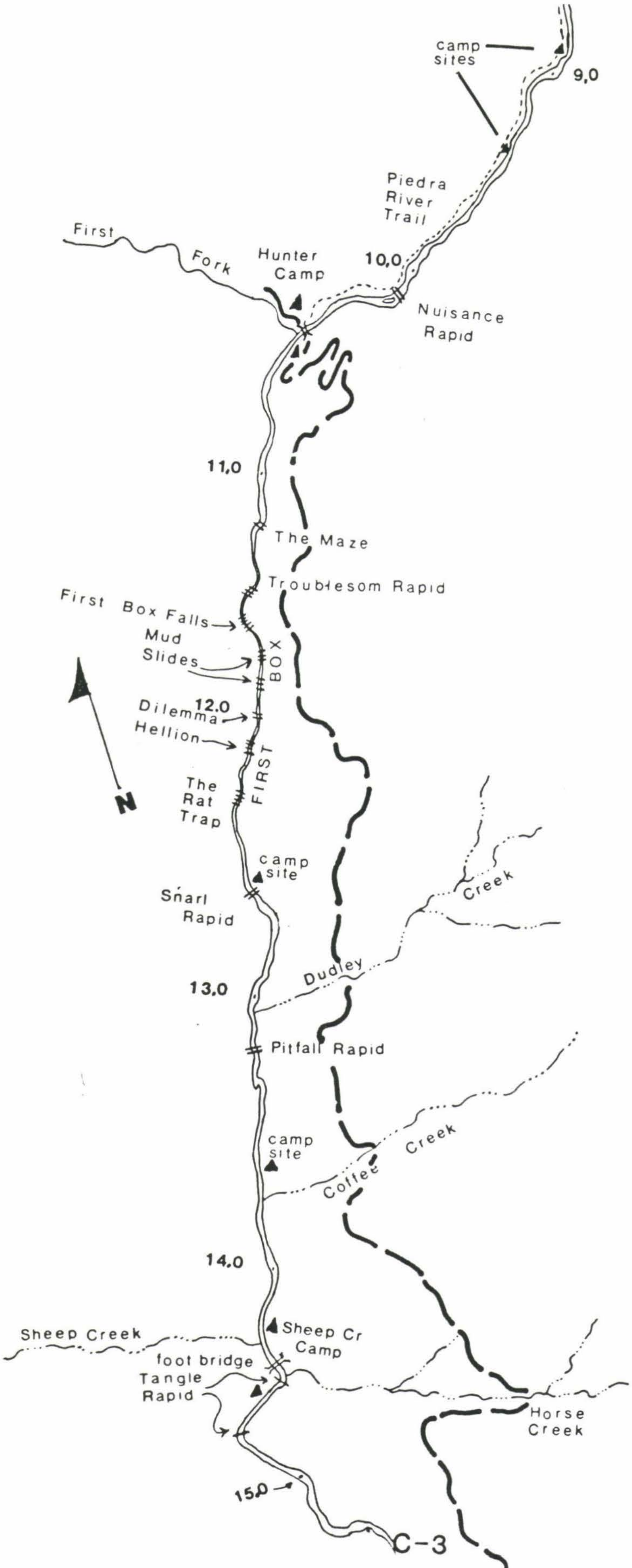
RIVER LOG MAP – PIEDRA RIVER


to Williams Creek Reservoir
MIDDLE FORK
PIEDRA RIVER
EAST FORK
RIVER MILEPOST 0.0 FDR 631 BRIDGE
FS
PVT
Williams Creek
Ice Cave Ridge
Trail Creek
Sally Overlook
FS
PVT
1.0
FOREST DEVELOPMENT ROAD 631
footbridge
O'Neal Creek
2.0
Piedra River Trail
N
footbridge
3.0
to Pagosa

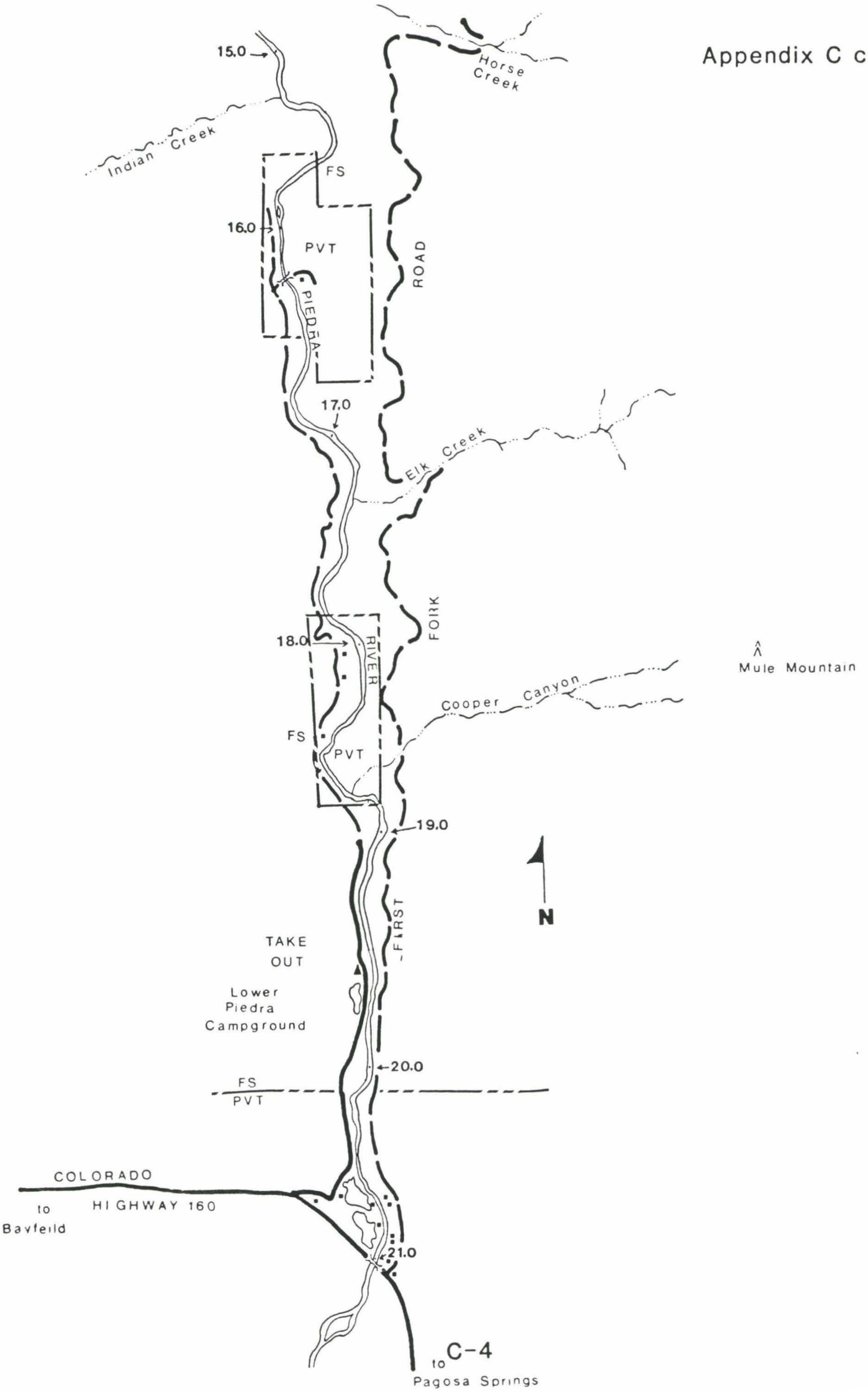
Appendix C cont.


CORRAL MOUNTAIN
3.0
foot bridge
Piedra Stock Trail
Weminuche Creek
foot bridge
4.0
N
Piedra River Trail
5.0
Snare Rapid
Sand Creek
6.0
Sand
7.0
Lone Tree Rapid
Second Box Canyon
8.0
Davis Creek Rapid
Davis Creek
camp sites
9.0

Appendix C cont.


camp sites
9.0
Piedra River Trail
First Fork
Hunter Camp
10.0
Nuisance Rapid
11.0
The Maze
Troublesom Rapid
First Box Falls
Mud Slides
FIRST BOX
12.0
Dilemma
Hellion
The Rat Trap
N
camp site
Snarl Rapid
Creek
Dudley
13.0
Pitfall Rapid
camp site
Coffee Creek
14.0
Sheep Creek
Sheep Cr Camp
foot bridge
Tangle Rapid
Horse Creek
15.0

Appendix C cont.



15.0
Horse Creek
Indian Creek
FS
16.0
PVT
ROAD
PIEDRA
17.0
Elk Creek
FORK
18.0
RIVER
Mule Mountain
Cooper Canyon
FS
PVT
19.0
FIRST
N
TAKE OUT
Lower Piedra Campground
20.0
FS
PVT
COLORADO HIGHWAY 160
to Bayfeild
21.0
to Pagosa Springs

C-4

RIVER LOG

The portion of the Piedra River from the Piedra River bridge to the U.S. Highway 160 bridge can be divided into essentially three sections: Launch to Sand Creek, the two box canyons, and Dudley Creek to take out. Launch to Sand Creek: The upper stretch has numerous riffles, one or two small rapids, many camping opportunities, and is rather narrow. The first couple of miles, until the Williams Creek confluence is reached, many ledges are exposed. Several times the river makes a 90 degree turn into a wall and at low water, hitting the wall is inevitable. The narrow stream winding through these small (fifty foot) cliffs is difficult to negotiate if the river has less than 300 - 400 cfs. Gradient: 53.3 ft./mi.

The two box canyons: The Second or Upper Box Canyon is considerably shorter to run than the Lower or First Box since only two rapids of any consequence slow progress. Landing and scouting the Upper Box can be difficult. The Lower Box (First Box) could present nearly insurmountable problems. At higher water, landing between rapids might be very precarious and result in running a rapid blind. Scouting in two cases is not only dangerous, but time consuming. Two rather sheer cliffs must be scaled to a height of about 75 feet above the river to get a look around the corner. Lining, particularly at high water, is a difficult undertaking, because the cliffs at some rapids rise directly out of the water. Camping is next to impossible in the box canyons because of the steep slopes. The First Box Canyon should not be entered late in the day. Gradient: 55.7 ft./mi.

Dudley Creek to take out: The final section of river from below the First Box to the Lower Piedra Campground has many tricky spots and a couple of noteworthy rapids.

The different nature of the hydraulics between high (2500 cfs) and low (1000 cfs) flows will be remarkable. The narrow channel and swift water will result in eye popping hydraulic jumps at high water and tight squeezes at low water. It is most important to recognize the type of water that is being boated and to plan accordingly. The boat may be hung on rocks often at low water.

The gauge at Arboles is recorded on tape and collected only at the end of each month. Therefore, it is necessary to obtain the water level information from another source. If the water is from bank to bank on the first corner upstream from the U.S. Highway 160 bridge, that is, that no shoal is exposed, then the water can be considered above 1000 cfs. A judgment can be made easily at the U.S. Highway 160 bridge to determine if the water is too high. If the river has good rollers under the bridge and a lot of turbidity, it may be close to 3000 cfs. Also, if the water is too high for a craft under the FDR 631 bridge or if the corner immediately after the bridge is too difficult to negotiate, then the trip should be postponed until lower water. Finally, if the Second Box Canyon was considered to be too hard or if a portage or line was necessary, then the First Box should not be run. The trip can be terminated at the First Fork bridge.

River Log: Refer to preceding maps.

Mile 0.0	Launch just downstream from Piedra Picnic Ground. Piedra River bridge about 150 yards ahead. Between bridge and launch is very swift water. At 1000 cfs or higher at the launch, the bridge and bridge piling could be trouble. Stay right under bridge as current washes toward piling and left abutment.
Mile 0.2	Riffle 1. (R-1). River narrows, makes s-turn around island and drops about 6 feet in fifty yards. Water rushes into wall at the end of s-turn.
Mile 0.4	R-2. River enters small narrow canyon and drops three feet several times.
Mile 1.5	R-3. Narrow channel, sweeping curve.
Mile 1.7	Williams Creek confluence.
Mile 1.8	Mile 2.0 R-4. Several riffles occur in this stretch.
Mile 2.2	R-5. Several large boulders on right. Stay left of center.
Mile 2.4	R-6. Two parts.
Mile 2.6	Trail Creek confluence. Private land ends shortly after Trail Creek.
Mile 3.1	R-7. Straight, bouncy. Left abutment of the trail bridge extends several feet out into river.
Mile 3.3	R-8. River piles into both ledges on s-turn.
Mile 3.6	Weminuche Creek confluence.
Mile 3.7	R-9. Watch scraping ledges.
Mile 4.2	R-10.

Mile 4.3	R-11.
Mile 4.5	Mile 4.7 R-12. Continuous riffles for three hundred yards.
Mile 5.1	R-13. Nearly a five foot drop around sweeping bend. Stay right of island.
Mile 5.2	Rapid 1. Rating I. Name: Snare Rapid. Easy rapid in rock strewn channel.
Mile 5.6	R-14. Sharp corner with 2 - 3 foot drop.
Mile 6.1	R-15. Stay right of island. Large rock extends from right bank and cuts channel in half.
Mile 6.2	Sand Creek confluence.
Mile 6.8	Enter Second Box Canyon.
Mile 6.9	R-16. Riffles over buried rocks in tight canyon. Huge log jam on right constricting channel. Dangerous at high water because of short notice and resulting 15 foot constricted channel. Scout next rapid.
Mile 7.1	Rapid 2. Raint III. Name: Lone Tree Rapid. Many rocks have fallen from the cliffs confining the river. Scout this rapid before passing the log jam just upstream. Pick a course through the rocks generally staying to the center and working the craft over to the right. Be sure to scout the entire rapid as there are some nasty sharp rocks in the center of the rapid towards the end that will be exposed in low water. At high water this rapid will have some big holes, but generally it will be easier to miss rocks.
Mile 7.2	Mile 7.3 R-17. A short series of riffles ending with a 4 foot drop and piling into the ledges on the left bank of a right turn.
Mile 8.2	Rapid 3. Rating III. Name: Davis Creek Rapid. Interesting rapid at both high and low water that requires precise manuevering. The river is pinched between a ledge on the left and a boulder on the right leaving about a ten foot wide channel at the start of the rapid. Land immediately above rapid to scout, right side is easiest. At high water this rapid will have large holes and easily be rated a IV. Emerge from Second Box Canyon.

Mile 8.3	R-18. Manuever around rocks in center of river.
Mile 8.9	R-19. Log jam on left with small drop. From this point to the First Fork bridge there are so many exposed rocks in the river with frequent drops that a course must be picked carefully through this continuous riffle.
Mile 9.1	R-20.
Mile 9.2	Mile 9.3 R-21.
Mile 10.1	Rapid 4. Rating II. Name: Nuisance Rapid. Although the left channel may appear to have more water in it and be a better choice, stay to the right of the island. Channel is narrow with ledges jutting out into current from right bank. The left channel has many obstacles including several logs around the corner near the end of the island.
Mile 10.4	R-22. Several small holes throughout three foot drop.
Mile 10.5	First Fork bridge and First Fork confluence.
Mile 10.7	Mile 10.9 R-23. The rocks in the riverbed are becoming progressively larger. Fast water in this rocky channel produces good waves.
Mile 11.2	R-24. Big rock and log are obstacles. Run the center course.
Mile 11.4	Rapid 5. Rating II. Name: Maze Rapid. Stay left at start, then work toward center. Scouting might be useful and is easy on left bank. Go to right of rock near the end of the rapid. Pull to left shore after river bends to the right against sheer wall for scouting the next rapid.
Mile 11.5	Rapid 6. Rating III. Name: Troublesome Rapid. Scout on the left by climbing cliffs. The scout is difficult and can be dangerous. Run the rapid by first approaching the right sheer wall then find the center and run through good rollers and fast water. Go to the right of the largest rock. Pull to shore immediately on left side to scout First Box Falls. More difficult in high water.

Mile 11.6 Rapid 7. Rating IV - V. Name: First Box Falls. This rapid is rated IV in low water and V in high. Above 4000 cfs this rapid may be a VI. Scouting this rapid is as difficult as running it. The scout may be accomplished in the same effort as the last one by climbing high and staying above the river around the left bend until it is possible again to reach the water. It is necessary to climb 75 to 100 feet above the river. There is no portage and the chance for lining the rapid is slim. The rapid is short, falling about 12 feet in 15 yards. Three large boulders constrict the river at the start of the falls followed by a four foot drop. When the water is near the top of these boulders, this could be a very dangerous rapid with a much larger drop. There are three channels, either the center or the left should be chosen. The water plunges onto partially exposed rocks surrounded by several holes. At high water, recirculation holes near the bottom could flip a raft or kayak. At the bottom of the falls the water piles into a sheer cliff.

Mile 11.7 Rapid 8 and 9. Rating III. Name: Mudslide Rapid. The next two rapids were formed within the last several years. Mud, boulders, rocks, logs, and debris constrict the channel and pose many hazards in the streambed. Easy scout on left, sheer cliff on right. Careful planning is needed to find the least troublesome route. This rapid will change from year to year as the debris and logs are removed. On the second portion, the clear channel will send the boat into the left sheer wall as the river turns right. Several holes before the wall make it nearly impossible to miss the wall. At very high water this could be a particularly dangerous rapid.

Mile 11.9 Rapid 10. Rating II. Name: Dilemma Rapid. Run through a four foot hole and bounce off a cliff protruding from right bank into current about half way across the river. At higher water missing the wall is a dilemma.

Mile 12.0 Rapid 11. Rating IV. Name: Hellion Rapid. The mischief maker is a big black rock in the middle of the river. This rapid should be scouted because two dangers exist: One is wrapping the boat on the rock. Second is to flip the boat sideways in the cushion wave when passing the rock on the left. Exposed rocks after the

	big black boulder are impossible to miss and getting hung up is probable. Staying left of the big black rock also increases the chance of hitting the left sheer wall which angles up and out into the current from the left bank.
Mile 12.2	Rapid 12. Rating III. Name: Rattrap Rapid. This rapid may be unrunnable with rafts at most water levels. Scouting this rapid is a problem. Scouting on the left is more difficult than on the right, but allows closer examination of the end of the rapid. A small island of large boulders and a rocky channel is the obvious route and after plowing through several holes and dodging numerous good size rocks, the river is forced back to the left by two large boulders. Lining is possible at lower flows, but tough. Scrambling over the boulders in the middle of the river, the boat can be lined on the right of the boulder island and swung to the left. No portage is possible as again the river fills the channel from cliff to cliff.
Mile 12.3	The cliffs disappear and the forested steep valley returns to the river. Good camp sites exist.
Mile 12.6	R-25. Straight shot with 2 - 3 foot drop.
Mile 12.7	Rapid 13. Rating II. Name: Snarl Rapid. Logs and cliff on right. Staying left and inside on the curve provides a runnable route.
Mile 12.8	R-26. Significant riffle.
Mile 12.9	Since the riverbed now is quite wide, the water may prove to be too low if below 1000 cfs at U.S. Highway 160 bridge.
Mile 13.2	Rapid 14. Rating II. Name: Pitfall Rapid. For fifty yards the river dashes over and meanders around rocks of every conceivable size and shape, then the main current runs headlong into a rock shaped like the bow of a ship and almost as large. Avoid the rock by going right.

Mile 13.3	R-27. Straight riffle but good long drop of about 5 - 6 feet.
Mile 13.5	R-28. Large boulders in the river will cause this riffle to be more difficult in high water. Seek channel in the middle of the river.
Mile 14.0	R-29. Boulders on the outside of the right turn will be hazardous at high water as the current sweeps over them.
Mile 14.2	Sheep Creek confluence.
Mile 14.3	Sheep Creek footbridge.
Mile 14.4	R-30. Sharp right bend forces water into left wall over short drop of three feet.
Mile 14.7	Rapid 15. Rating I. Name: Tangle Rapid. Manuevering through rock garden, first run along the ledge on the right, then follow current through boulders and logs.
Mile 15.1	R-31. Four foot drop.
Mile 15.2	R-32. Significant riffle.
Mile 16.2	Note 3. Bridge hazard. At high water clearance will only be two to three feet. At low water, a line of rocks will appear directly under the bridge. Run left channel.
Mile 17.8	R-33. Large boulders in river combined with slight drop give a test of visual perception to pick out route.
Mile 18.0	Shoal creates minor problem. Enter one mile of private land.
Mile 18.5	R-34. Flood from side creek deposited material in the riverbed cutting the channel in half. Nice drop and a straight shot.
Mile 18.8	R-35. Surprise ledge stretches across river with two foot drop.
Mile 19.2	R-36. Good drop but easy.

Mile 19.4	R-37. Last riffle but still plenty of rocks to go around.
Mile 19.5	Lower Piedra Campground.